SEPTEMBER
1949

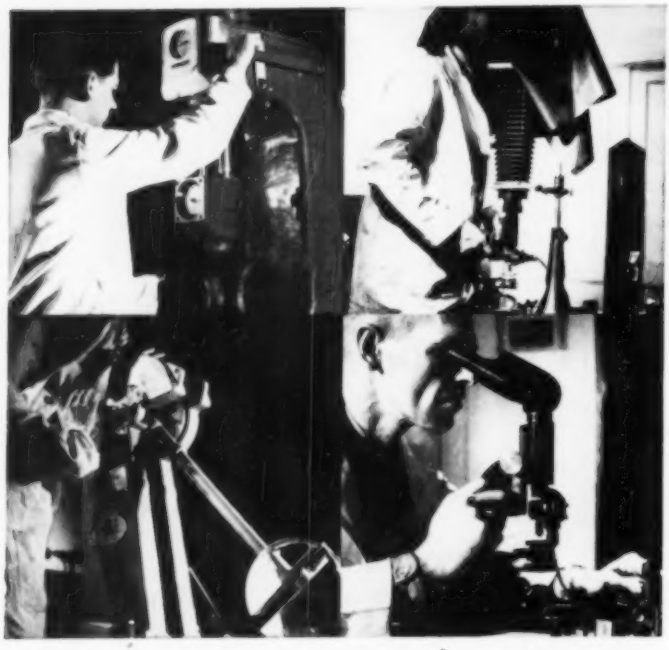
Chemical Engineering

WITH CHEMICAL & METALLURGICAL ENGINEERING

THE WEST—WHAT ITS CHEMICAL INDUSTRY HAS AND WHAT IT NEEDS. SEE 16-PAGE REPORT STARTING ON PAGE 123

A McGraw-Hill Publication

Fifty Cents



Raw material control means better Tube-Turn welding fittings

What's a piece of steel made of?

THE quality of a finished product is largely dependent on the quality of the raw material from which it is made. That's why Tube Turns' laboratory technicians thoroughly test every lot of seamless steel tubing received in the Tube Turns, Inc. plant.

Answers to that important question —*What's a piece of steel made of?*— are determined in two ways. First, by chemical tests that disclose the exact percentage of the various elements present in the steel. And, second, by physical tests to determine the steel's tensile strength, yield strength, and elongation. Unless the steel measures up in all respects, the entire lot is rejected.

At the end of these tests, not only is the chemical composition of the steel known, but an accurate appraisal of its metallurgical and physical characteristics has been made. And these facts are filed by the laboratory control number rolled into each fitting to identify it permanently with the lot of steel from which it was made.

This rigid control over raw material is your assurance of basic quality in the Tube-Turn welding fittings you buy. Modern equipment in the hands of skilled technicians permit only the best steel to be used for the manufacture of Tube-Turn products.

Remember, you can always bank on good service in good connections every time you specify "Tube-Turn."

TUBE TURNS, INC.

238 East Broadway, Dept. I, Louisville 1, Kentucky

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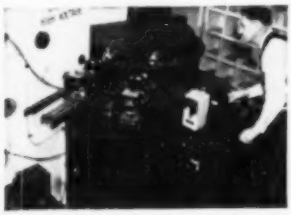
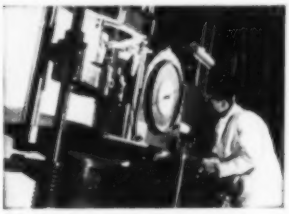
WELDING FITTINGS AND FLANGES



Foolproof chemical analysis of steel is made quickly and accurately on this Spectroscope, typical of the modern equipment used by Tube Turns, Inc. in the control of raw material.



Tensile strength of all seamless steel tubing is accurately measured on this machine, capable of exerting a force of 60,000 pounds. Yield strength and ductility are also checked here.

Periodic checks on the hardness of the steel are made with this Rockwell instrument to determine the strength, ductility, and machinability of the material. Brinell equipment is also used to check hardness.

Advance indication of what will happen to the steel during processing is determined with this electric furnace, one of a battery. Heat treatment to which the material will be subjected is duplicated here.

SEPTEMBER
1949

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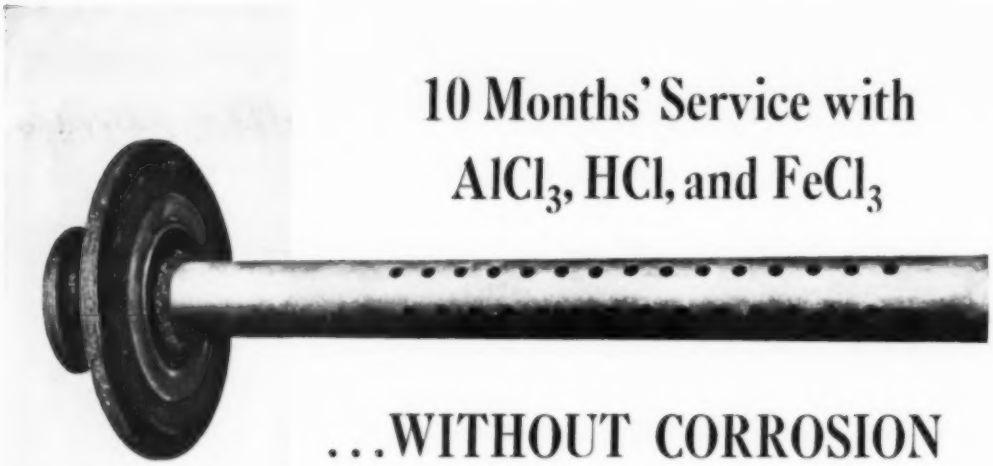

10 Months' Service with $AlCl_3$, HCl, and $FeCl_3$ ...WITHOUT CORROSION

This sparger unit – made of HASTELLOY alloy C – is used to introduce gases into a catalytic reactor used in the production of styrene for polystyrene plastics and for synthetic rubber.

Machine marks are still visible on the sand-cast surface of this unit, although it has already been in service for over 10 months in contact with aluminum chloride, hydrogen chloride, ferric chloride, and hydrocarbon gases and liquids at temperatures of 240 to 270 deg. F. And it is expected to last indefinitely under these severely corrosive conditions. The unit previously used required replacement every three or four months at considerable expense and loss of time.

HASTELLOY alloy C is available in a variety of wrought forms and also as conventional or precision castings to meet your requirements. In addition to its excellent corrosion resistance, this alloy has high strength – even at red-heat temperatures – and it can be readily fabricated by most common methods. For more complete information, write for a copy of the booklet, "HASTELLOY High-Strength, Nickel-Base, Corrosion-Resistant Alloys," Form 3361.

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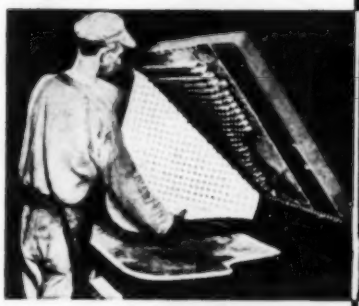

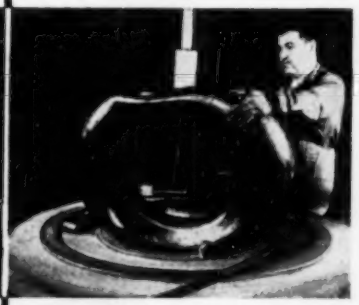

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"Carbowax" Compounds
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Trade-Mark

They { *leave little residue....*
are water-soluble....
are less volatile than glycerine....

Polyethylene glycols, CARBOWAX compounds, and UCON lubricants have three outstanding advantages as rubber release agents and lubricants:

1. They offer a wide choice of products to meet particular requirements.
2. They leave a minimum of residue in the molds, resulting in longer operation before shut-down for cleaning purposes.
3. They are water-soluble, permitting easy application and removal.

These lubricants are used to treat tire bags for tire molding and to release many types of molded rubber objects such as hose cured on mandrels, sponge and foam rubber products, shoe soles and heels, extruded products and battery cases. They are also excellent lubricants for rubber shackles and joints and for rubber machining operations. Effective anti-stick agents for piled rubber slabs are formulated with these products. Water insoluble UCON lubricants are also available which are desirable in many applications.

All of these products may be used with or without other materials such as wetting agents, mica, clay, and organic solvents.

For more information about these polyalkylene glycol lubricants write Department FC for the booklets, "CARBOWAX Compounds and Polyethylene Glycols" and "UCON Fluids and Lubricants."

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AO 700 RUBBER-FRAME GOGGLE

Here's the chemical worker's favorite for "4-in-1" eye protection against splashes, spray, foreign particles and fine dust concentrations. Goggle features a genuine rubber frame which is non-irritating and acid resistant; positive safety is assured by an airtight fit and all face-contacting surfaces are broad for maximum comfort. Large, shatter-resistant, easily replaceable acetate lens gives wide vision and resists fogging because perforations at frame top and sides permit ample air entry. Easily adjustable rubber headband.

AO 705 SUPER-VENT GOGGLE

WHERE IT'S HOT AND HUMID the super-vent nose piece of this goggle is a friend indeed! Its inhalation and exhalation valves prevent fogging and steaming.* Acid or dust can't seep through the airtight frame molded from acid-resistant, non-irritating rubber. Further ventilation and anti-fogging are provided by perforations at top and sides. Ventilation is indirect, dust cannot reach eyes. Headband and lens are similar to those of the "700" goggle.

*On inhaling, air removes moisture on inner lens surface before it can fog. Exhaling, inlet valve closes, allowing moist air to escape through exhalation valve.

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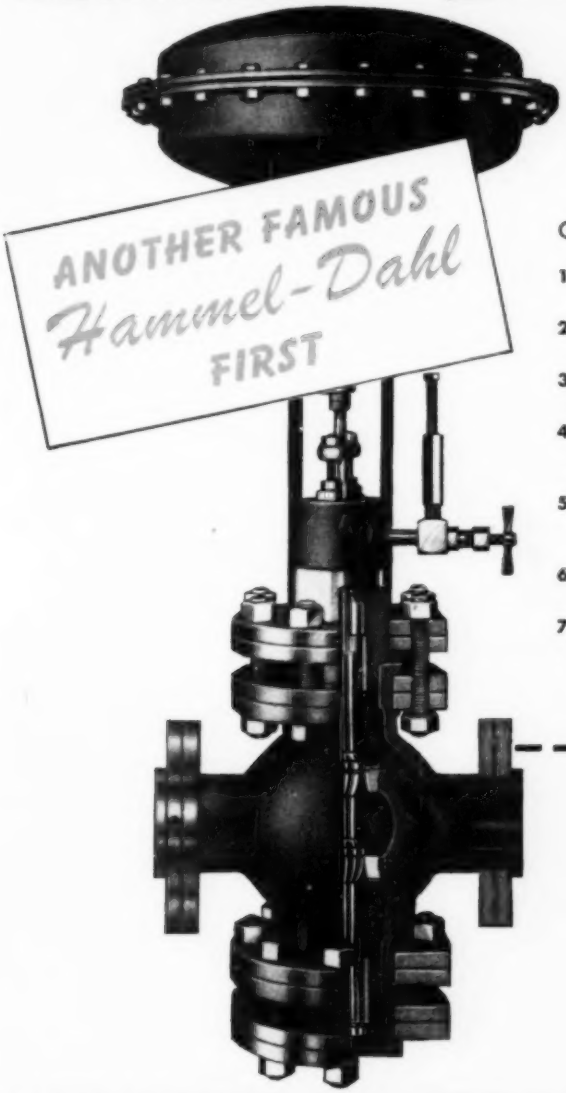

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Hammel-Dahl Steel SPLIT-LAP Flange Construction has the following advantages:

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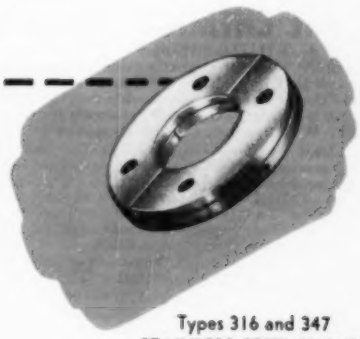
2. Bodies can be fabricated of any type Stainless Steel as well as any alloy that can be cast.
3. Barstock bonnets and blind head flanges are Standard construction.
4. Simplifies piping, as Van Stone split-lap type flange can be rotated to match bolt holes in pre-fabricated piping.
5. Body wall thickness is 600# A. S. A. Standard, but interchangeable flanges of 150# or 300# are supplied.
6. Stock valves have 300# A. S. A. Standard face to face dimensions.
7. ALLSTEEL Superstructure Standard construction, of course.



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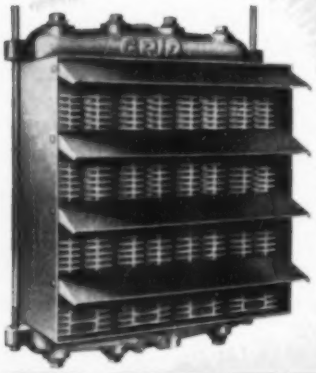


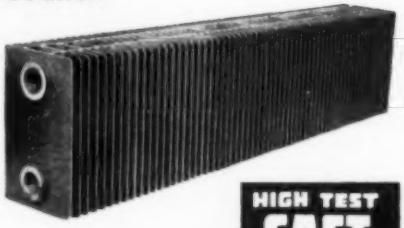
Gentlemen:
The first GRID Unit Heaters were installed by us eight years ago. We have found the cast iron construction stands up very well against the corrosive fumes of HCl., Cl_2 etc., and as far as we know there has not been any maintenance on the units. The unit heaters having copper tubes gives trouble due to corrosion in a few years... We consider the GRID Unit Heaters satisfactory and would certainly recommend them for installation where corrosive acid fumes exist.

Yours truly,

A LARGE EASTERN CHEMICAL PLANT

GRID *Equipment*

WILL STAND UP UNDER CONDITIONS PECULIAR TO THE CHEMICAL INDUSTRY

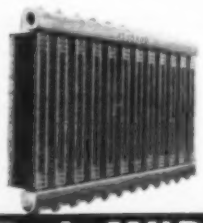


Not only do GRID Unit Heaters stand up against the corrosive fumes of HCl and Cl_2, but even in that service they are maintenance-free. Chemical plants that have used GRID Unit Heaters continuously since 1931 report "they have given us trouble-free heating service ever since the day they were installed," and this season they still did an efficient heating job. Why this long continuous service to the chemical industry?

GRID Unit Heaters are designed to eliminate maintenance . . . GRID heating sections are ONE piece construction high test cast iron of the same composition as is used in steam tight vessels for high pressures. That's why GRID Unit Heaters may be used safely on steam pressures up to 250 lbs. In GRID condenser "fin" sections there are no soldered, brazed, welded or expanded connections to become loose or develop leaks, breakdowns or heating failures . . . no electrolysis to cause corrosion that produces leaks, breakdowns and heating failures, because there are no dissimilar metals used in GRID construction.

HIGH TEST CAST IRON ONE PIECE CONSTRUCTION HEATING SECTIONS

GRID Unit Heaters are designed to save fuel cost, too, because they provide heat where it is most needed—to the working zone. Careful selection of fans and motor speeds eliminates stratification of warm air at ceiling level . . . GRID Unit Heaters are designed for low outlet temperatures and greater air delivery to the floor line — *not the ceiling* . . . that's another reason why chemical plants all over the country prefer GRID.



For tempering outside air, drying, process work, GRID Blast Coils have the same high efficiency and lasting qualities as GRID Unit Heaters . . . heating sections the same ONE piece construction high test cast iron guaranteed for steam pressures up to 250 lbs. . . . no electrolysis . . . no tortuous air passages . . . freedom of expansion with complete absence of ruptures, strains and warping . . . open design for easy cleaning . . . atmospheric conditions such as dust, fumes, etc. cannot retard their operation. Compact they occupy less space than other types of cast iron blast coils of equal capacity.

GRID cast iron "fin" sections are adaptable for use as radiators, either open or convector types.

Investigate the GRID system for chemical plant heating. It's different and time-proved.

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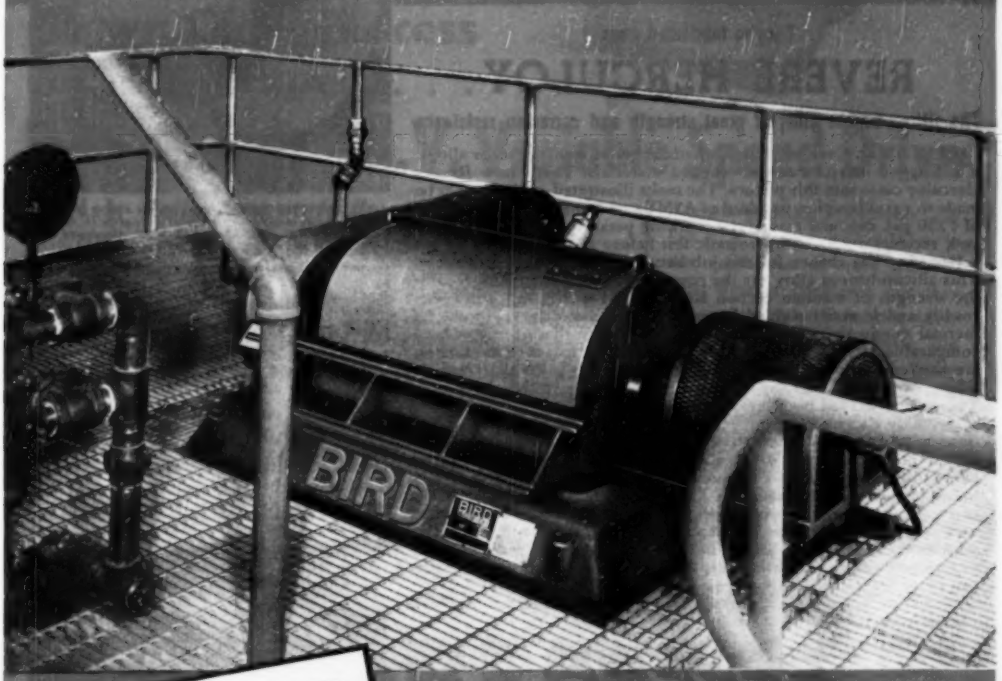


THE BIRD CONTINUOUS CENTRIFUGAL **FILTER**

Inside story of the

300 TANKS made for rugged ALASKAN SERVICE

They're fabricated from

REVERE HERCULOY

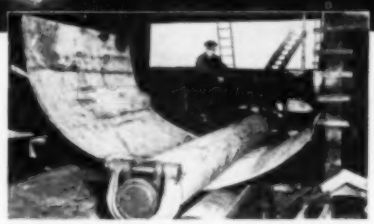
The silicon-bronze alloy of great strength and corrosion resistance

ALASKA is no place for sissies, whether they be men, metals or alloys. Rugged service calls for rugged materials. That's how Revere Herculoy came into this picture. The tanks illustrated, which had to be made to a combination standard of ASME and Army specifications, are of 1250 gal. cap. and made for a working pressure of 127½ lbs. Each tank receives a 300 lb. hydrostatic test before shipment.

Herculoy was chosen for this job because of its unusual properties. This silicon-bronze alloy has the corrosion resistance of copper with the strength of medium carbon steel. It cold-works and hot-works readily and is easily welded by any of the commercial methods, its thermal conductivity being roughly only 10% of that of copper and comparable to that of mild steel, thus high thermal losses of conduction are not encountered. In the case of the tanks shown the welding method employed was the Heliarc process, using ¼" Herculoy rod. Tanks were welded both inside and outside.

Herculoy also has superior fatigue resistance, and is used in operations requiring resistance to alternating and cyclic stresses. It is but one of the many Revere Metals and Alloys and combinations of alloys being used more and more by more and more industries for the really tough jobs. For these industries have found there are many uses for copper and copper alloys of which they had never before dreamed . . . uses that have resulted in substantial savings, longer life, improved performance. They have also found that because of the many years of experience working with copper, Revere Technical Advisory Service can be of real help in solving many of their problems.

So, before placing your next order, why not call the Revere office nearest you?



ROLL OUT THE TANKS—Here you see a sheet of Revere Herculoy being rolled into cylindrical shape at the H. AMICK SHEET METAL WORKS, Seattle, Wash. Heads are then welded onto both ends of these cylindrical shells.

HOT SHOT FOR COLD TANKS—After welding is completed a removable heating element made of Revere Copper tube is placed into the tank. These elements range in sizes of from 3 sq. ft. of surface to 750 sq. ft.

HEADED FOR THE FROZEN NORTH—These completed tanks awaiting shipment are 48" x 168" and are the largest of the group of some 300 made of Revere Herculoy by H. AMICK SHEET METAL WORKS for use in Alaska.

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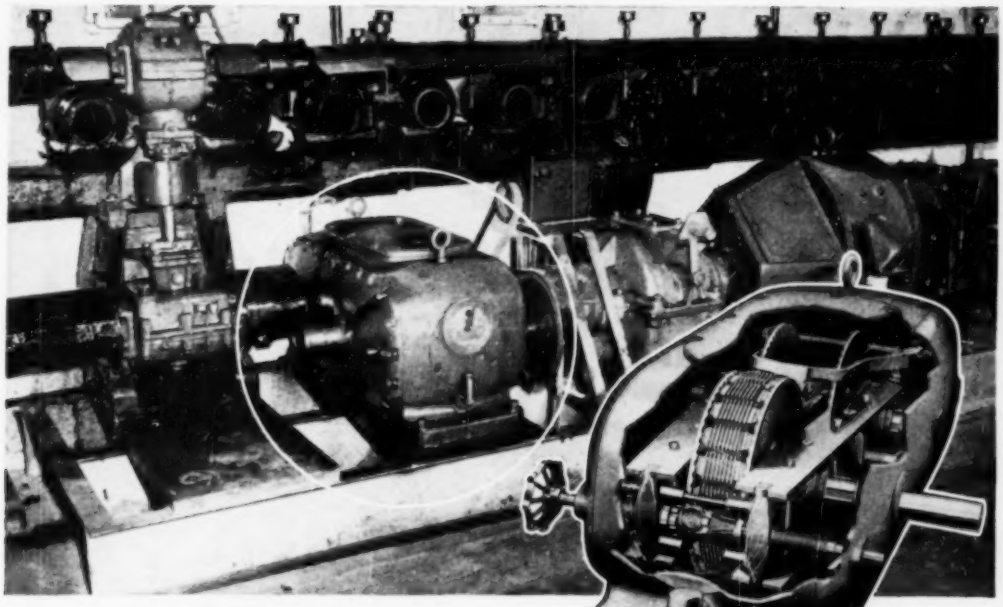

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Lehr Rolls Accurately Synchronized with Drawing Machine to Avoid Buckling

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ERECTION—Competent field erection crews are available for the installation of your Graver equipment. These crews are your assurance of a job well done in this final phase of meeting your water conditioning problem.

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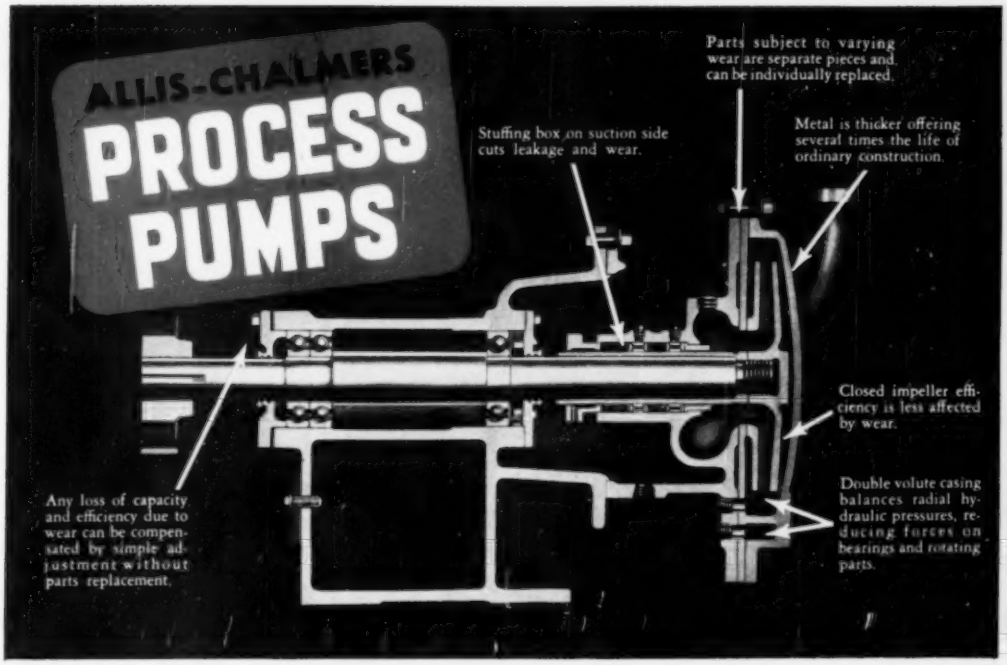
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PROCESS PUMPS
Parts subject to varying wear are separate pieces and can be individually replaced.
Stuffing box on suction side cuts leakage and wear.
Metal is thicker offering several times the life of ordinary construction.
Closed impeller efficiency is less affected by wear.
Double volute casing balances radial hydraulic pressures, reducing forces on bearings and rotating parts.
Any loss of capacity and efficiency due to wear can be compensated by simple adjustment without parts replacement.

Stop Pump Troubles } ON ABRASIVE CORROSIVE JOBS

- **Pump Life Multiplied**
- **Maintenance and Overall Costs Cut Sharply**

THIS A-C PROCESS PUMP was made for abrasive and corrosive jobs on which ordinary pumps, even when made of special materials, run up sky-high maintenance bills. Here is the pump for uninterrupted service and amazingly low maintenance costs handling liquids of medium and heavy specific gravities with abrasive solids or mild corrosive action or both.

RECORD SAVINGS

Users report savings of as much as $1,000 per year per pump. A typical user replaced parts in 6 to 10 weeks even using toughest alloys. Now he reports no replacements on A-C process pumps in 20 months.

STOCKED IN 4 MATERIALS

Shipment from stock on complete pumps and all parts in aluminum-bronze, Ni-resist, 18% chrome steel and 316 stainless steel. You need not carry spare parts. For more information, see your A-C Authorized Dealer or Sales Office or write for bulletin 08B6615. A-2735

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Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

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MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.

Power plant built for The Corn Products Refining Company at Corpus Christi, Texas. Photo by Elwood Payne.

DOWN TO ESSENTIALS... and Profits

This power plant *without roof and without walls*—and *without* the obvious maintenance costs that roof and walls normally drain from profits—is characteristic of Ferguson *engineering.* Here, needless capital investment has been by-passed and power producing costs permanently reduced—a prime example of the Ferguson formula of getting down to *fundamentals* and eliminating non-essentials.

More than two decades of world-wide experience in the design and construction of large and small power plants of every type, utilizing many kinds of fuel, has given Ferguson a thorough understanding of the complex problems of power generation, and a full knowledge of what is needed for profitable operation—tomorrow as well as today.

Ferguson clients are satisfied clients. Why not join them? Our nearest office is ready to provide you with current cost data on power production—as well as processing, research, manufacturing or warehousing facilities.

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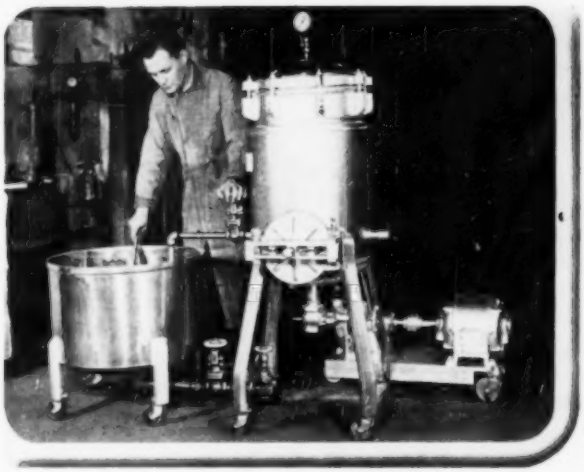
ALOYCO STAINLESS STEEL VALVES

prove they can "take it" in Niagara Filters



Niagara Pilot Filter Unit with Aloyco Gate Valves of 18-8SMo stainless steel.

"It is a rare occasion when we have to replace one of the Aloyco Stainless Steel Valves," says the Niagara Filter Corporation.

Yet they say: "The use of Aloyco Valves on these all-stainless steel pilot filter stations puts them to quite a severe test, since these units are rented to all types of companies in the chemical, food, fermentation and process industries, and they must withstand the corrosive action and varying operating conditions of all types of food and chemical liquors. We ourselves often do not know what these units are being used for, but judging from the reconditioning required occasionally, they get some pretty rough usage . . ."

No company—*not even yours*—can afford the expensive luxury of frequent valve replacements these days. You can save money all along the line by specifying Aloyco Stainless Steel Valves for your corrosive-fluid pipelines.

Aloyco Flanged Gate Valve, No. 111, 150 lb., ½" to 12" inclusive. Available in 18-8S, 18-8SMo, Aloyco 20 and other corrosion-resistant alloys.

GATE, GLOBE, Y, CHECK, TANK, SAMPLING AND Y-POST VALVES

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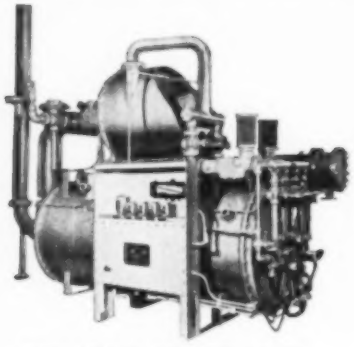
INERT GAS . . . automatically produced . . . at 8¢ to 15¢ per mcf! . . .



Kemp Model 20 MIHE Inert Gas producer, 20,000 cfh discharged at 10" W.C. Completely wired and ready for immediate connection to utilities.

How does that compare with what you are now paying for inert gas?

The difference tells you how long it will take to pay for a Kemp Inert Gas producer out of savings.

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Not only in cost of gas, but in freedom from wrestling with CO_2 bottles . . . in the opportunity to use inerts as generously as you wish . . . in the ability to pipe it throughout the plant for use in blanketing, agitation, fire-protection . . . in the ability to turn it on and off at need with production cost per Mcf uniform at high or low demand.

Send for a Kemp engineer . . . there's one near you who knows your problems and how Kemp can help save money for you.

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PRECISION CARBURETORS. BURNERS FOR INDUSTRIAL HEAT CONTROL. FIRE-CHECKS AND OTHER SAFETY DEVICES. ATMOSPHERE GENERATORS. INERT GAS PRODUCERS. ABSORPTIVE DRYER SYSTEMS FOR PROCESS CONTROL.

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Meet a man who "works" in dozens of industries.

Right now he's engaged in compounding a special adhesive. Perhaps tomorrow he'll be working on a spray-on sound deadener. The next job might be a sizing, a saturant, a laminant, or a coating.

But whatever the job, it has this in common with all the others. The resulting product will be developed *with given characteristics to meet certain established requirements.*

Are you looking for an asphalt, resin, rubber or latex compound to take its place in your manufacturing process? Or do you want one for recombining? Whichever it is, he can help you.

And for "plant protection," you can't do better than Flintkote Protective Coatings. These specialized products are available in many forms to meet requirements for corrosion-protection . . . waterproofing and dampproofing . . . insulation coating . . . and many other important jobs around your plant.

Get complete information on the Flintkote line. We'll be glad to recommend a standard product to meet your needs, or to work with you to develop something to meet unusual requirements. Mail the coupon or write our nearest office.

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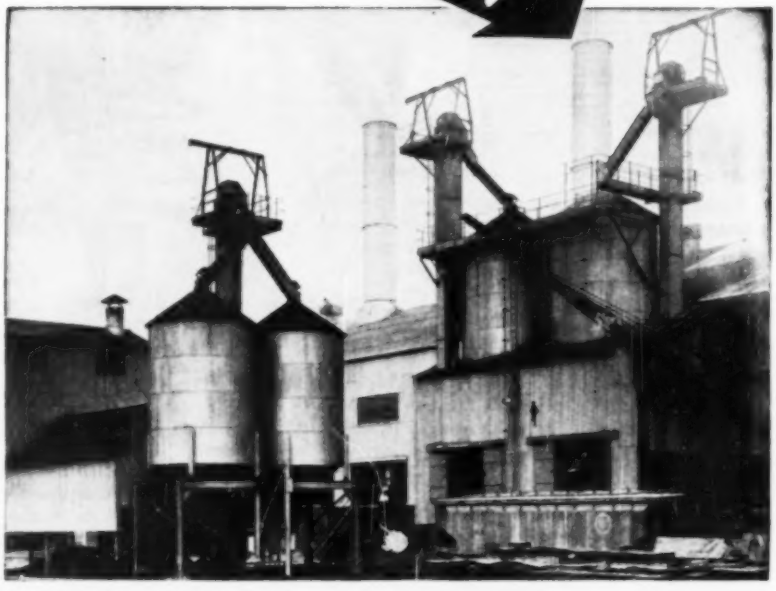
Nearly every plant has need for a bucket elevator—lifting material up into the air so that something else may be done with it. A certain height — certain capacity — certain results. There is a bucket elevator in the broad Jeffrey line to do that job to your complete satisfaction. Standards have been worked out—to save you time—to save you expense in making layouts. Complete drawings to suit each particular elevator. We will go into detail.

This large plant utilizes Jeffrey Bucket Elevators in the preparation of carbide.



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U.S.I. CHEMICAL NEWS

September ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1949

U.S.I. Ready to Discuss Customer Requirements Of Synthesis Chemicals

Alcohols, acids, aldehydes, and ketones from the hydrocarbon synthesis process at Brownsville, Texas, will become available, it is now estimated, starting early in 1950. U.S.I. is ready now to discuss the individual requirements of prospective users of these important synthesis products. The chemicals to be offered include:

Alcohols
- Methanol
- Ethanol
- Normal-propanol
- Isopropanol
- Normal-butanol
- Isobutanol
- Normal-pentanol
- Isopentanol

Acids
- Acetic acid
- Propionic acid
- Butyric acid
- Isobutyric acid

Aldehydes
- Acetaldehyde
- Propionaldehyde
- Butyraldehyde

Ketones
- Acetone
- Methyl ethyl ketone
- Methyl propyl ketone
- Methyl butyl ketone

Oil Pierces Hole in Steel In New Punching Method

A practical method for using oil to pierce holes in steel has been developed. Ordinarily, metal punches are used to pierce sheet steel, but the new method is said to replace the punch with a column of oil. Greatest advantage of the "liquid impact" method is reported to be the saving of cost in making and replacing intricately shaped metal punches.

Hard, brittle silicon sheet steel wears out metal punches rapidly. The oil, on the other hand, does not wear out, but is merely recirculated and formed into a new "punch" over and over again. Another advantage claimed for the new method is that it permits use of "soft" steel dies instead of case-hardened steel dies that must be used with metal punches.

Gives German Process Data For Drugs, Intermediates

Translations of technical material on German manufacturing processes for drugs, drug intermediates, and fine chemicals are said to be available now. Included are research reports on new drugs and novel methods of preparation and testing.

New Permanent Antifreeze To Be Marketed by U.S.I.

U.S.I. Ethylene Glycol Permanent Antifreeze Protects against Sub-Zero Temperatures, Prevents Corrosion

This fall, for the first time, U. S. Industrial Chemicals, Inc., will market an ethylene glycol permanent antifreeze. Brought out to meet demand of antifreeze jobbers for a permanent antifreeze as a companion to the time-tested favorite, Super Pyro, U.S.I. Permanent Antifreeze will be available only in limited quantities this first season. Hopes are high, however, for a greater supply for the next antifreeze season.

U.S.I. is by no means a newcomer in the field of permanent antifreeze manufacture. For a number of years U.S.I. has furnished many well-known companies in the industry with ethylene glycol, which these companies have sold under private brand names. Now, U.S.I.'s own permanent antifreeze will be available to take an important place in meeting the needs of distributors and the motoring public.

Boil-proof, Freeze-proof, Rust-proof

The new U.S.I. Permanent Antifreeze is substantially boil-proof; one filling lasts all winter. It affords protection against freezing far down into sub-zero temperature ranges, and a carefully chosen combination of rust inhibitors guards against corrosion in the automobile's cooling system. When used in accordance with instructions, U.S.I. Permanent Antifreeze is guaranteed not to clog passages in the system; not to damage automobile finishes, or metal or rubber parts in the cooling system; and not to leak out of a cooling system that does not leak water.

U.S.I. will, of course, again market Super Pyro Antifreeze this season. Super Pyro was introduced in 1932 as the first premium antifreeze concentrate scientifically compounded to do more than merely protect against freezing. Today's long-lasting, eco-

MORE

Booklet Tells How and Why Of Centrifugal Pump Care

A 16-page booklet on the care of all makes of centrifugal pumps was released recently. Giving information about pump construction and its effect on maintenance, the bulletin reportedly tells how to figure head, and contains tables for determining total friction loss. Causes and cures of various pump troubles are discussed, together with little-known facts about cavitation and how to protect against it. The booklet also relates common mistakes in packing stuffing boxes.

ATTENTION

Users of Specially Denatured Alcohol

Now is the time to renew your basic permit (Treasury Department Form 1479) for 1950. If you require forms or any assistance in their preparation, please call your nearest U.S.I. office.

Old Man Winter will hold no threat for motorists who use the new U.S.I. Permanent Antifreeze. One filling can give protection for the entire winter against freezing temperatures.

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September ★ **U.S.I. CHEMICAL NEWS** ★ 1949

CONTINUED

Permanent Antifreeze

nomical Super Pyro is 33 1/3 per cent more effective than most other types of antifreeze. It protects all seven metals in the automobile cooling system against rust, and is free from unpleasant fumes.

Research Assures Continuing Improvement

A special section of U.S.I.'s technical development laboratory at Baltimore devotes

Packaging gallon cans of U.S.I. Permanent Antifreeze at the New Orleans plant. Containers for the new permanent antifreeze come in gallon and quart sizes.

itself to a constant search for improved antifreezes. Tests are continually made of the effects of antifreezes on all kinds of metals, rubber, finishes, and any other substances with which they may come in contact. The research laboratory compiles accurate data on freezing points, boiling points, toxicity, fire hazard, and thermal properties of antifreeze products. U.S.I.'s research also serves to keep the company abreast of any changes in design of automobile cooling systems which might mean the altering of antifreeze properties.

New Spring Has Unique Negative Force-Deflection

An unusual type of spring which resists less the more it is deformed is said to have been invented. Besides its unique negative force-deflection, the new device has four other significant properties: enormous expandability; ability to act around corners and through small openings with freedom comparable to that of non-elastic bands; high initial force in resisting first increments of deflection; and ability to store and deliver about twice as much energy as an ordinary spiral or power spring occupying the same space. Potential uses of the new spring are said to range all the way from delicate instruments to toasters.

Chlorophyll Tooth Paste To Prevent Dental Decay

Research on tooth paste containing chlorophyll indicates that it does away with all the conditions generally regarded to be the causes of dental decay. Chlorophyll has been known for its ability to speed healing of certain gum ailments, including non-specific gingivitis and trench mouth. The new tooth paste, containing water-soluble derivatives of chlorophyll, is said to have greater ability to lower acid content of the mouth than any other known substance. It reportedly has similar power to prevent formation of bacterial acids associated with tooth decay.

Portrays Flavors, Aromas

A new method whereby flavors and aromas can be evaluated objectively and portrayed pictorially was described recently by a pair of researchers.

Diamonds Now Recovered

A new process for economically and profitably recovering industrial diamonds and diamond dust from carbide grinding sludge or dusts is said to have been developed.

TECHNICAL DEVELOPMENTS

Further information regarding the manufacturers of these items may be obtained by writing U.S.I.

An improved rust-inhibitive paint-primer and finish coat combined is reported to give deeper penetration, high gloss, and tougher weathering. **(No. 489)**

For determining evaporation rates of all solvents having a viscosity less than 100 cp., and determining solvent release characteristics of resin solutions, a new device is said to be available. **(No. 490)**

Knives that require no sharpening for three years can now be made, it is reported, by a new "frozen heat" process. **(No. 491)**

To speed up precision filling of ampoules and small bottles by as much as 10 times, a new powder filling machine is claimed to measure accurately chemical, pharmaceutical, or other powders in any quantity from .01 cc. to 7 cc. and then to dispense automatically the desired amounts into containers at strokes from 11 to 22 per minute. **(No. 492)**

To inhibit mildewing of linens, a new chemical, said to require no special equipment or handling, is available. A few cents worth of the material in the final clear rinse when laundering will treat several hundred pounds of linens, it is claimed. **(No. 493)**

A new, inexpensive type of tank heater employing finned tubes gives good heat transfer, it is claimed, and is easy to install and maintain. It is adaptable to almost any requirements, the makers state. **(No. 494)**

For research in synthesis of surface active agents, pharmaceuticals, and other chemicals, a manufacturer offers inexpensive, purified vegetable sterols in tonnage quantities. **(No. 495)**

New long-life fluorescent lamps, said to last from 2½ to 6 years, reportedly deliver over 200 per cent more lighting value than previous lamps, and cut replacement costs by two-thirds. They remain bright and clean, with very little discoloration, up to 5,000 burning hours, the makers claim. **(No. 496)**

Binding of booklets, reports, technical data, photographs, etc., with plastic sheet bindings can be accomplished in less than a minute, it is claimed, with new, economical, portable equipment requiring no special skill to operate. **(No. 497)**

To rotate drums for mixing and agitating, and to move them from place to place, a new portable, motorized drum-cradle truck, suitable for containers from 1-gal. round cans to 55-gal. drums is reported on the market. **(No. 498)**

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Specially Denatured—all regular and anhydrous formulas
Completely Denatured—all regular and anhydrous formulas
Pure—190 proof, C.P. 96%, Absolute
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PHTHALIC ESTERS
Diamyl Phthalate
Dibutyl Phthalate
Diethyl Phthalate
OTHER ESTERS
*Diatol
Diethyl Carbonate
Ethyl Chloroformate

INTERMEDIATES
Acetoacetanilide
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Acetoacet-ortho-chloroanilide
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Ethyl Benzoylacetate
Ethyl Sodium Oxalacetate
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*Arofene—pure phenolics
*Arochem—modified types
Ester Gums—all types
Congo Gums—raw, fused & esterified
Natural Resins—all standard grades
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CPR Concentrates
Piperonyl Butoxide
Piperonyl Cyclonene
*Pyrenone Concentrates
Pyrethrum Products
Rotenone Products
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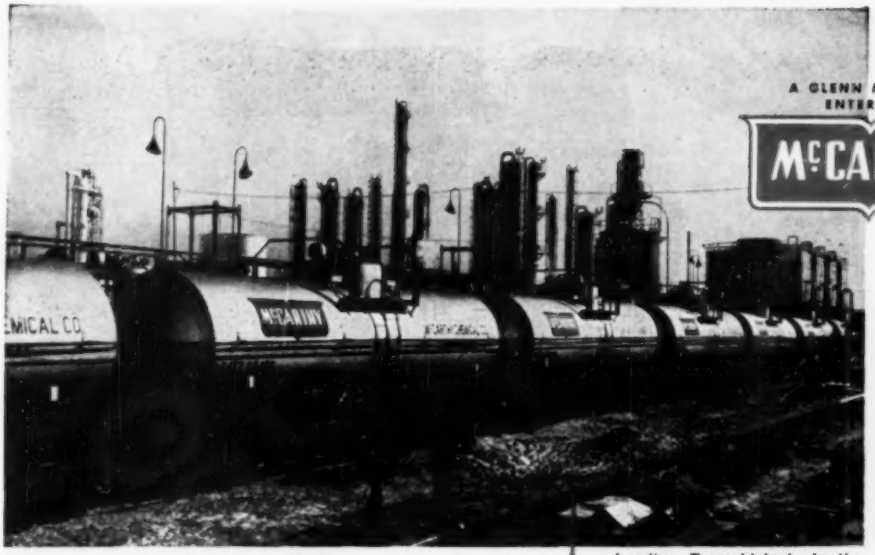

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McCARTHY

Loading Formaldehyde in the 10,000 gallon tank cars operated by McCarthy. Each car is especially lined and insulated.

Time to Talk '50 with McCarthy

Chemical process industries are planning ahead, checking 1950 contract needs, looking to the McCarthy Chemical Company to meet those requirements from the predictable volumes of primary and intermediate chemicals flowing today from the new McCarthy unit at Winnie, Texas.

Assured supplies of petro-chemicals are made possible by the unique McCarthy "flow-chart" — a production cycle that begins and ends with McCarthy-owned and operated facilities and resources that provide unlimited reserves of natural gas, a supervised gathering system and the fully controlled processing of hydrocarbons.

From well to market, this steady and uninterrupted flow of raw materials for plastics, dyes, explosives, paints and other chemical applications is helping meet today's demands efficiently, economically, promptly.

Now it's time to talk '50 with McCarthy. Look to McCarthy Chemical Company for your 1950 contract requirements—consult McCarthy about your needs. Write, wire or call today.

- **37% Inhibited Formaldehyde**
- **37% Uninhibited Formaldehyde**
- **Methanol**
- **Propane**
- **Acetaldehyde**
- **Fuel Oils**
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- **Gasoline**
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New Horizons in Hydrocarbons

McCarthy producing companies are planning ahead with industry, exploring New Horizons in Hydrocarbons through more economical, more efficient processes, conserving more and more of our valuable natural resources by converting yesterday's wastes into today's valuable raw materials.

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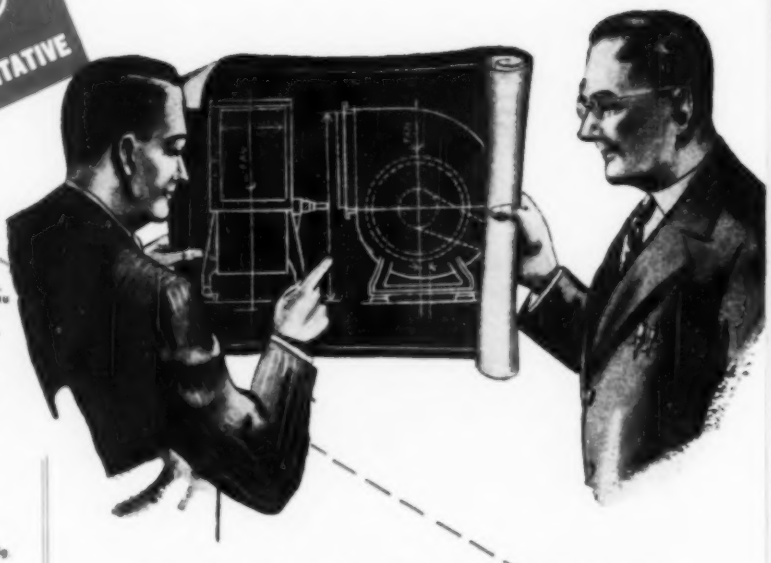

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READY AND COMPETENT

to work with your consulting engineer

ON YOUR AIR PROBLEMS

To make your investment in air pay you maximum dividends, it's more than a matter of buying a *good* fan or a *good* air conditioning unit. In today's complex air handling problems, proper selection of equipment is often the only answer — plus an effective *link* between your own engineer and the firm supplying the equipment.

This is one of the reasons why "Buffalo" installations have been so satisfactory to users. "Buffalo" equipment, a complete line of field-proven fans and air conditioning units — *plus* the "Buffalo" representatives at left — give you this ideal combination.

"Buffalo" representatives know their equipment and the jobs it is designed to handle. They are Graduate Engineers with one to five years of factory training, in addition to wide field experience. And they have all the resources of the "Buffalo" home plant engineering staff to back them up.

Buffalo Air Conditioning Cabinet

Buffalo Air Washer

Buffalo Limit-Load Fan

"Buffalo" FIRST FOR FANS

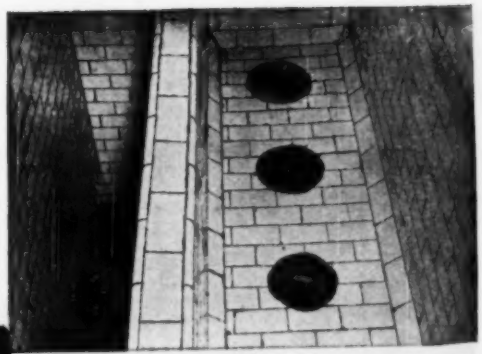
BUFFALO FORGE COMPANY

501 BROADWAY BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont., Branch Offices in all Principal Cities

VENTILATING FORCED DRAFT | AIR WASHING COOLING | AIR TEMPERING HEATING | INDUCED DRAFT EXHAUSTING PRESSURE BLOWING

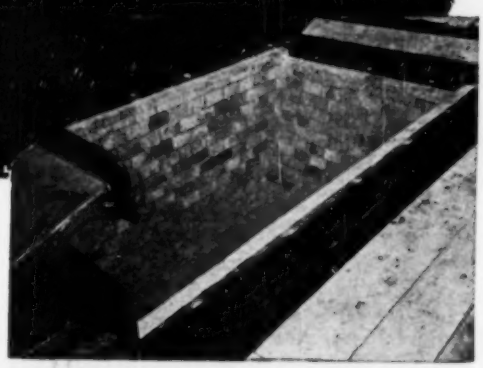
PENCHLOR® ACID-PROOF CEMENT bonds the acid-proof brick on this industrial floor which has never needed repair in 14 years of attack by H_2SO_4. Penchlor is one of Pennsalt's silicate type cements . . . chemical-setting, quick-hardening, thorough-curing . . . designed to resist a wide variety of acids.



PENNSALT CAUSPLIT® CEMENT was used in this tile lining to resist attack from acids and alkalies alternately. Causplit Cement is resistant to alkaline conditions and will also resist many acids.

CORROSION doesn't have a toe-hold here . . .

PENNSALT PRF CEMENT was installed 1 year ago in this industrial waste tank handling spent pickle liquors and alkaline cleaner solutions, and the joints are still in excellent condition. PRF Cement is a resin-type, quick-setting, cold-hardening cement designed to resist most alkalies, acids and solvents.



PENNSALT ASPLIT® CEMENT bonds the acid-proof brick in this continuous pickling tank, operating at 210°F. Built 8 years ago, the joints are still free from attack. Asplit Cement is a self-hardening resin cement of unusual strength and toughness, and high resistance to a wide variety of acids.

PENN SALT

CORROSION-RESISTANT CEMENTS
of many types for Acids, Alkalies, Solvents

Silicate Type
Penchlor® Acid-Proof Cement • Penchlor® Fire-Proof Cement

Resin Type
Asplit® Cement • Causplit® Cement • Pennsalt PRF Cement • Pennsalt PRFK Cement • Pennsalt HF Cement • Pennsalt HFK Cement

Acid and Alkali Resistant Paints
Pennpaint #1—Primer and Clear Lacquer

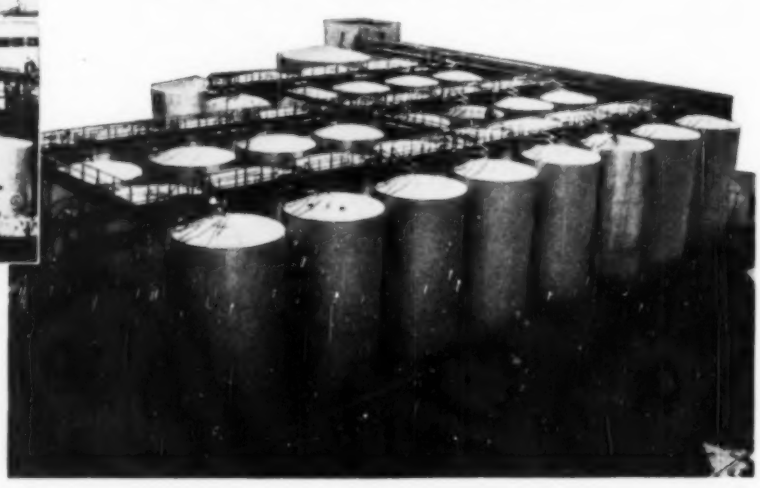
®Reg. U. S. Pat. Off.

If you have a problem in construction which involves acids, alkalies or solvents, you may find a practical and economical answer in Pennsalt Cements and Pennsalt technical service. Pennsalt has developed a superior line of corrosion-resistant cements to meet almost any corrosion situation . . . and will gladly cooperate with you in working out the technical details of the job. Write in full detail to Special Chemicals Division, Pennsylvania Salt Manufacturing Company, Philadelphia 7, Pa.

Glycerides and fatty acids PROTECTED

by Inconel-Clad and Stainless-Clad Steels in Swift's new plant

Lukens Inconel-Clad Steel was used by Blaw-Knox Company in fabricating this fat-splitting column for Swift & Company.



Some of these storage tanks, and preparation tanks inside the plant, are Lukens Stainless-Clad Steel; built by General American Transportation Corporation.

To utilize raw materials from its many plants, Swift & Company recently put this new industrial oil processing plant into production at Hammond, Indiana. Many of its products go into cosmetics, toilet creams, soaps and similar items, so protection against metallic contamination is vital. Lukens Clad Steels help provide that protection.

Fat splitting is done in a continuous, high-temperature hydrolysis unit, producing fatty acids which are high in quality and light in color. Since they come in contact with only the corrosion-resistant interior surfaces of the clad steel tower, preparation and storage tanks, there's no metallic contamination to affect them.

Lukens Clad Steels—Nickel-Clad, Stainless-Clad, Inconel-Clad and Monel-Clad—offer you the protection of these *solid* corrosion-resistant metals with the economies of *clad* steels.

In each, a uniform thickness of the cladding material, usually 10% or 20% of total plate thickness, is permanently bonded to a steel backing plate. The extra-smooth sodium hydride finish makes equipment extra easy to keep clean.

Bulletins 255 and 338 tell you more about Lukens Clad Steels. For copies, write Lukens Steel Company, 400 Lukens Building, Coatesville, Pennsylvania.

CLAD METAL STEEL

LUKENS

Nickel-Clad Stainless-Clad
Inconel-Clad Monel-Clad
STEELS

SOLID METAL ADVANTAGES WITH CLAD STEEL ECONOMY

1 TIMKEN 18-8 STEEL TUBING Shows the best combination of creep strength, oil corrosion resistance and oxidation resistance up to 1500°F.

2 TIMKEN SICROMO 5 S STEEL TUBING For oxidation resistance to 1500°F. Good creep strength and corrosion resistance to 1300°F.

3 TIMKEN 2¼% CR-1.0% MO STEEL TUBING For service up to 1150°F. Has greater resistance to creep than 2% Cr. ½% Mo. Steel.

4 TIMKEN DM STEEL TUBING For service up to 1150°F. This steel offers outstanding creep strength.

5 TIMKEN SICROMO 9 M STEEL TUBING This steel possesses the maximum corrosion resistance of any of the steels below the stainless group.

6 TIMKEN 4-6% CR MO STEEL TUBING For service up to 1200°F. Superior corrosion resistance. Less oxidation resistance than Sicromo 3.

7 TIMKEN SICROMO 2 STEEL TUBING For service up to 1200°F. where better scale resistance is required than can be obtained with 2% Cr. ½% Mo. Steel.

8 TIMKEN CARBON-MO STEEL TUBING For temperatures up to 1000°F Improved creep strength makes it safer than carbon steel.

9 TIMKEN SICROMO 7 STEEL TUBING For applications requiring better corrosion resistance than can be obtained with 5% Chromium type steels.

10 TIMKEN SICROMO 3 STEEL TUBING For service up to 1200°F. Has excellent oxidation resistance and good corrosion resistance.

11 TIMKEN 2% CR ½% MO STEEL TUBING For service up to 1150°F. Intermediate corrosion resistance plus good creep strength, fair oxidation resistance.

12 TIMKEN CARBON STEEL TUBING Generally for service not exceeding 900°F., where corrosion and oxidation resistance are not important.

12 popular steels—which one will give the best life/cost ratio for your tubes?

CHANCES are that several of these tube analyses will give you a *better* answer to your particular problems of heat, corrosion or pressure than the tubes you are now using.

But only one will give you the most *economical* answer in terms of maximum life per dollar invested.

How to choose? That's a job for a specialist!

Let the metallurgists of The Timken Roller Bearing Company analyze your high temperature tube problems. With 19 years of experience and research to aid them, plus a wide selection of fine alloy steels tailored to meet every kind of operating condition, they can recommend the steel that will do your job most efficiently —and at the lowest possible cost.

Regardless of the analysis selected, you can be sure of getting the same scientifically controlled properties and the same high quality in every shipment of Timken tubes you buy. That's because the Timken Company rigidly controls quality through every step of production—from melting to final tube inspection. No other alloy steel producer enjoys such an outstanding reputation for consistent maintained quality.

The Timken analysis service is free to high temperature tube users—no obligation whatsoever. Why not take advantage of it now? Just write The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

50th birthday of the company whose products you know by the trade-mark: TIMKEN

Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing.

the trend is to TRENT

LARGE DIAMETER STAINLESS STEEL TUBING

Here's why:

- Largest variety of sizes — 4" to 30" inclusive
- Finished tubing . . . machine-formed, machine-welded machine-sized for uniformity
- Made in a *tube* mill by *tube* experts
- Tested cold rolled sheets . . . completely fused into finished tubing *without* added rod metal
- No zone of weakness for corrosion to attack
- Uniform section, metallurgically correct
- Available for fabrication with any fittings
- All finishes available

These features add up to better tubing that's easier to apply and maintain, and economical as well. That's why more and more fabricators, designers and manufacturers of chemical processing equipment are turning to Trent for their tubing requirements. The complete Trent line . . . ⅛" to 30" inclusive . . . offers reliable service in such applications as liquor lines, stock lines, heat exchangers and all other process piping where stainless can be used.

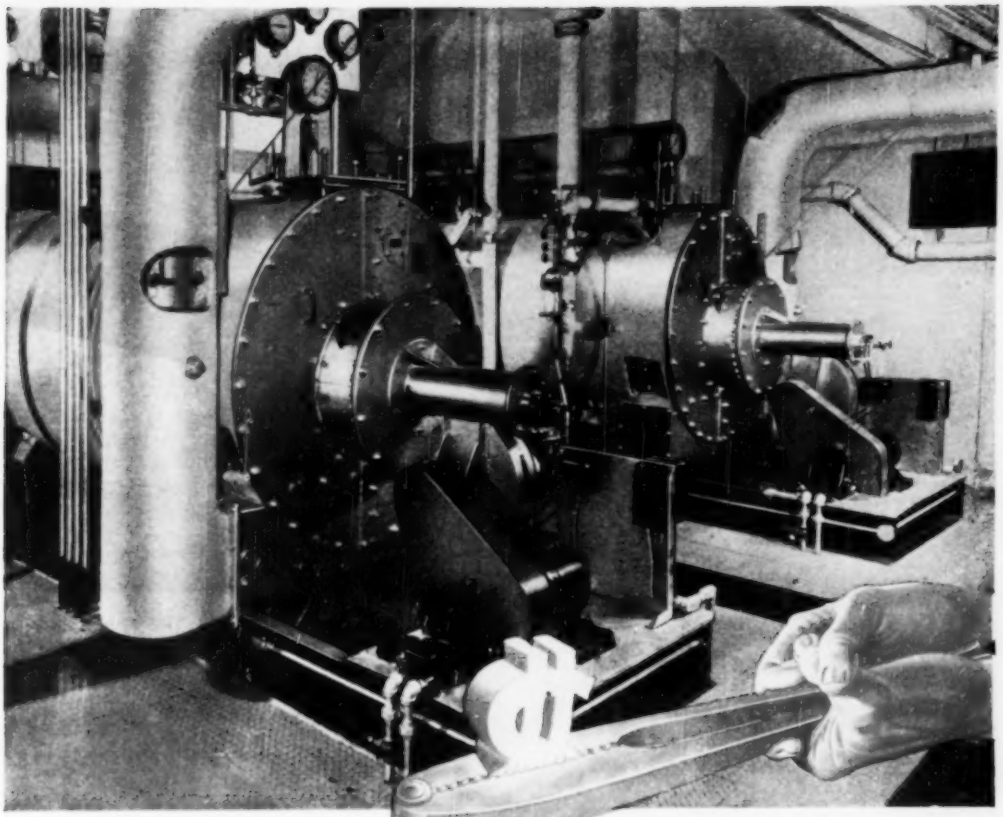
When you do business with Trent, you get top quality tubing PLUS engineering consultant service that helps you put stainless tubing to work in your application . . . *Better!* Write for Trent Data Bulletin and tell us what application you have in mind.

TRENT TUBE COMPANY

Subsidiary of Crucible Steel Company of America

General Office and Plant — East Troy, Wisconsin • Sales Offices: Chicago: 4501 W. Cortland St. — New York: Chrysler Building

TRENT STAINLESS STEEL TUBING



Put the Squeeze on

Steam Costs

NEVER forget boilers burn dollars — dollars that represent steam costs and a goodly share of your operating costs. Conditions today demand that you put the squeeze on steam costs along with your other costs. Begin with your boiler — investigate to see how much it is giving you for your fuel and operating dollars — see if it measures up in earning power as well as horsepower.

For any boiler installation (15 to 500 HP.) — new or replacement — Cleaver-Brooks offers these immediate and long range cost-saving advantages:

A Custom-Planned Boiler Engineered for Your Needs: Your steam needs and steam-using equipment are studied — your present total steam load plus your estimate of future expansion are considered — with this information the size of Cleaver-Brooks Boiler best suited to your specific needs is determined.

Factory Starting Service: Your boiler is placed in operation by Cleaver-Brooks factory service-engineers. Your operators are trained in operation, care and maintenance.

Flexible Operation Burning Gas or Oil With Equal Efficiency: You can use oil, gas, or combination oil and gas, whichever is of lower cost. Through their high heat transfer, Cleaver-Brooks boilers operate at a guaranteed efficiency of 80% from full load down to 30% of rating.

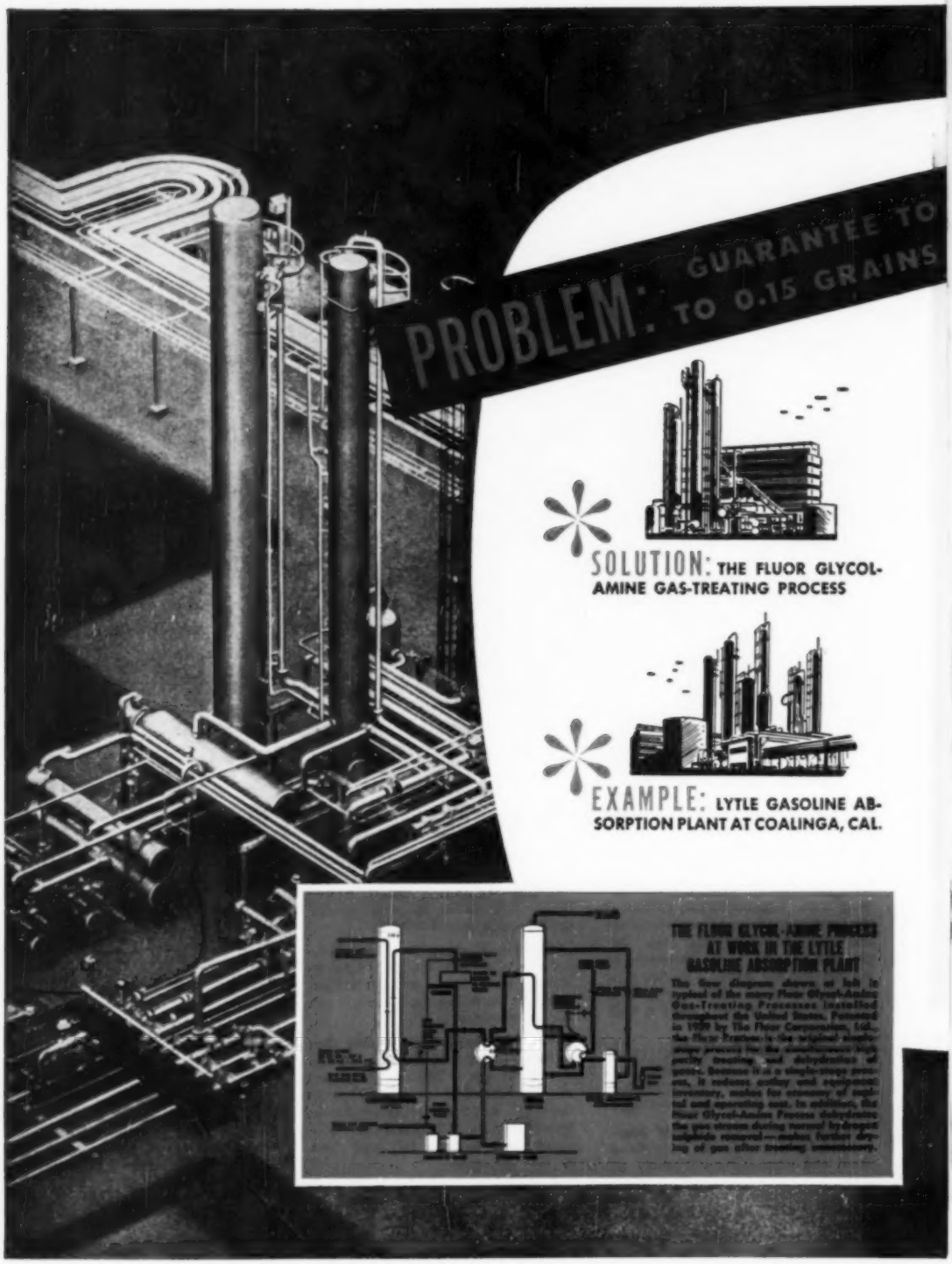
In addition, Cleaver-Brooks boilers give you clean, smokeless operation — eliminate fuel and ash handling — require no high or costly stacks — no special foundations — fit under low headroom — provide quick steaming, flexible operation to meet fluctuating loads — fully meet all codes.

Available in sizes 15 to 500 HP., 15 to 200 P.S.I. — write for Cleaver-Brooks steam boiler bulletin.

CLEAVER-BROOKS COMPANY
339 E. Keefe Ave., Milwaukee 12, Wis.

WRITE on your business letterhead for Steam Cost Calculator— a ready reference slide rule showing comparative steam costs when using oil, gas, or coal as fuel. Mailed on request — no obligation.

Cleaver-Brooks
STEAM BOILERS


PROBLEM: GUARANTEE TO
TO 0.15 GRAINS
SOLUTION: THE FLUOR GLYCOL-AMINE GAS-TREATING PROCESS
EXAMPLE: LYTLE GASOLINE ABSORPTION PLANT AT COALINGA, CAL.
THE FLUOR GLYCOL-AMINE PROCESS AT WORK IN THE LYTLE GASOLINE ABSORPTION PLANT

The Lytle Gasoline Absorption Plant at Coalinga, California, is a story of the Fluor Glycol-Amine Gas-Treating Process at work.

Expansion of natural gas supply through deeper drilling introduced into the Lytle Plant a natural gas so high in hydrogen sulphide content that it was no longer acceptable as commercial sales gas. After processing for gasoline recovery, the discharge gas was analyzed and found to contain 1.25 grains of hydrogen sulphide per 100 SCF and up to three-fourths of 1 mol per cent of carbon dioxide. Even though this gas was sufficiently pure for sale in many areas, in this particular instance requirements for commercial gas were set to *not more than 0.15 grains of hydrogen sulphide per 100 SCF*... a purity requirement so stringent that it would only be attempted by Fluor Gas Processing Engineers using the Fluor Glycol-Amine Gas-Treating Process.

Following study of the requirement by Fluor, a Research Department pilot plant was set to run at gas composition and operating conditions simulating those at the Lytle Plant. Here it was *proved* the Fluor Glycol-Amine Gas-Treating Process could meet—*and exceed by a comfortable operating margin*—the 0.15 grain per 100 SCF requirement efficiently, economically, and on a guaranteed basis.

The plant for the Lytle job was then designed on the findings of the Fluor Research Department. Engineering was set in motion, and a field construction schedule formulated.

The Lytle unit is a "sweet"-running unit paralleling laboratory and pilot plant findings—meeting its guaranteed performance with an adequate margin. This new installation raises the total installed capacity of Fluor Glycol-Amine Gas-Treating Plants to 585,000,000 SCF/D.

Fluor invites owners and operators of gas-producing properties to submit their gas-treating problems for study and recommendation by Fluor's Gas Processing and Research Engineers. Let them study *your* particular problem—the range of purity obtained through use of the Fluor Glycol-Amine Gas-Treating Process is virtually unlimited. It may be the low-cost answer to your gas-treating problem.

member

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Designers and Constructors of Refinery, Chemical and Natural Gas Processing Units.

Manufacturers of Cooling Towers, Fin • Fan Units, Mufflers, Gas Cleaners, and Pulsation Dampeners.

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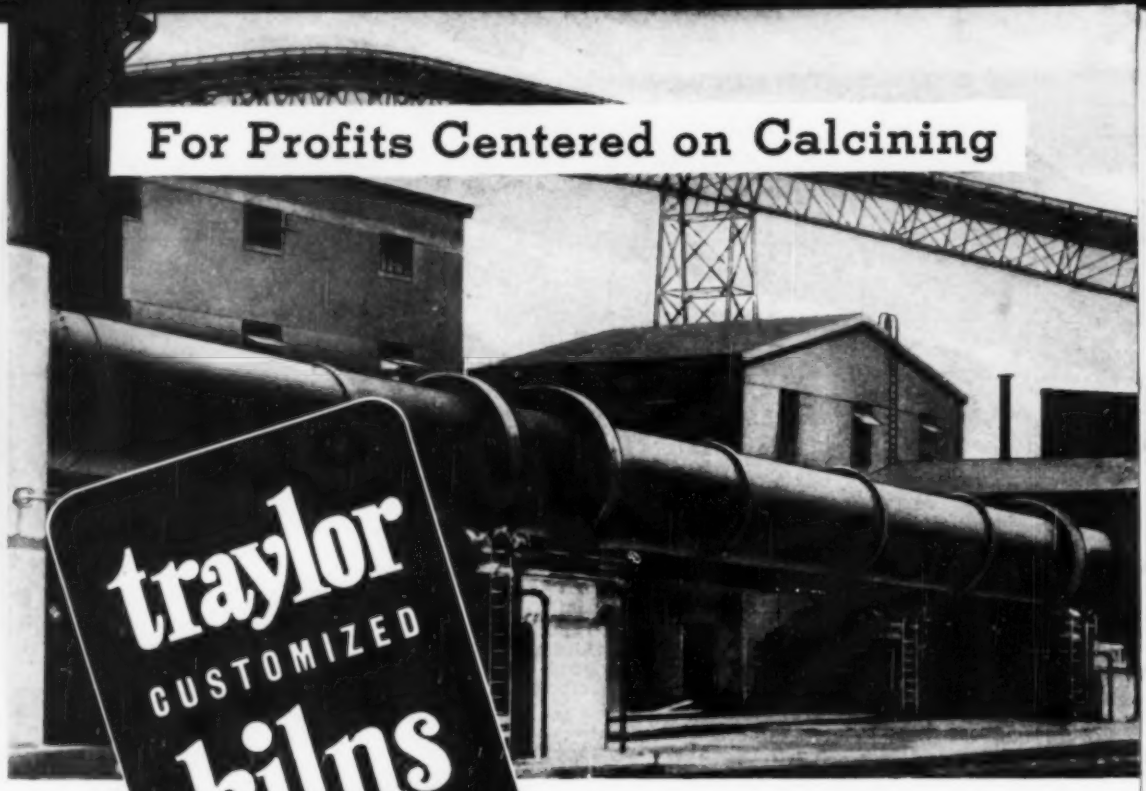

. . . ENGINEERED FOR EFFICIENT THERMO-PROCESSING

OPERATING AND MAINTENANCE costs of any Traylor Kiln are low because Traylor's vast kiln building experience has developed sound design and construction over many years. Of chief importance is the accurate alignment and rigidity of Traylor Kiln Shells. Electro-welded to unit strength . . . reinforced at every circumferential joint . . . with added strength of extra-thick plate under each riding ring . . . Traylor Kiln Shells are easy turning.

Accurate control and efficient utilization of applied heat is engineered into every Traylor Rotary Kiln. Analysis of the specific application *before building* each Traylor Kiln assures understanding of the problems at hand . . . maximum efficiency of the process planned.

Learn the full story of more profitable thermo-processing. Write today giving a brief outline of your requirements for more specific information on Traylor Rotary Kilns, Coolers and Dryers.

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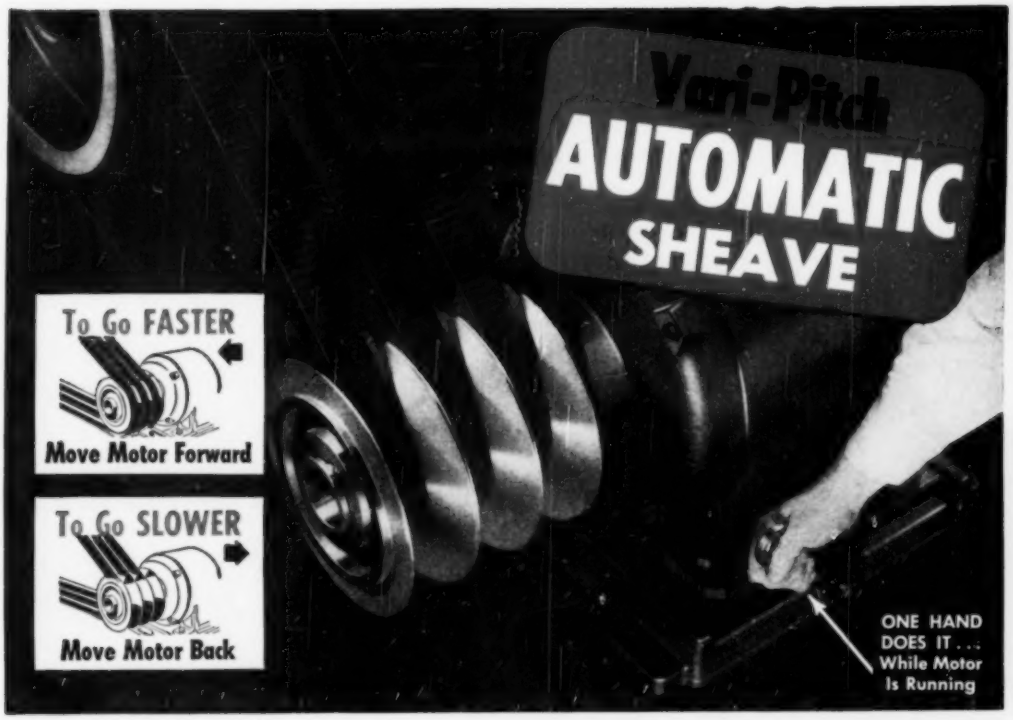
181 Mill Street, Allentown, Pa.
Canadian Mfrs: Canadian Vickers, Ltd., Montreal, P. Q.
Sales Offices: New York, N.Y., Chicago, Ill., Los Angeles, Calif.

TRAYLOR
ROTARY KILNS
Coolers · Dryers · Feeders
Gyratory Crushers · Reduction Crushers
Jaw Crushers · Grinding Mills

A "Traylor" Leads to Greater Profits



New Texrope Sheave Gives Lowest Cost

Instant Speed Control

- Covers most speed changing needs from 3 to 20 hp
- Very simple — one sheave does all
- Infinitely variable speed — 100% increase; 2 to 1 range.

THE NEW *Vari-Pitch* AUTOMATIC SHEAVE is the simplest, most economical method of instant speed control ever devised. You just move the motor forward to increase speed and move the motor back to decrease. The *Vari-Pitch* Automatic Sheave changes pitch diameter and holds the belts at proper tension *automatically*.

Now, you can cut unit costs by operating machines at most efficient speed . . . improve quality by compensating for material variation . . . with a very small investment in new equipment. Today, ask your A-C Authorized Dealer or Sales Office to give you complete facts and figures on how the new *Vari-Pitch* Automatic Sheave can save money in your plant. Or write for bulletin 20B7223. A-2767

ALLIS-CHALMERS, 1147A SO. 70 ST.
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Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

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Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

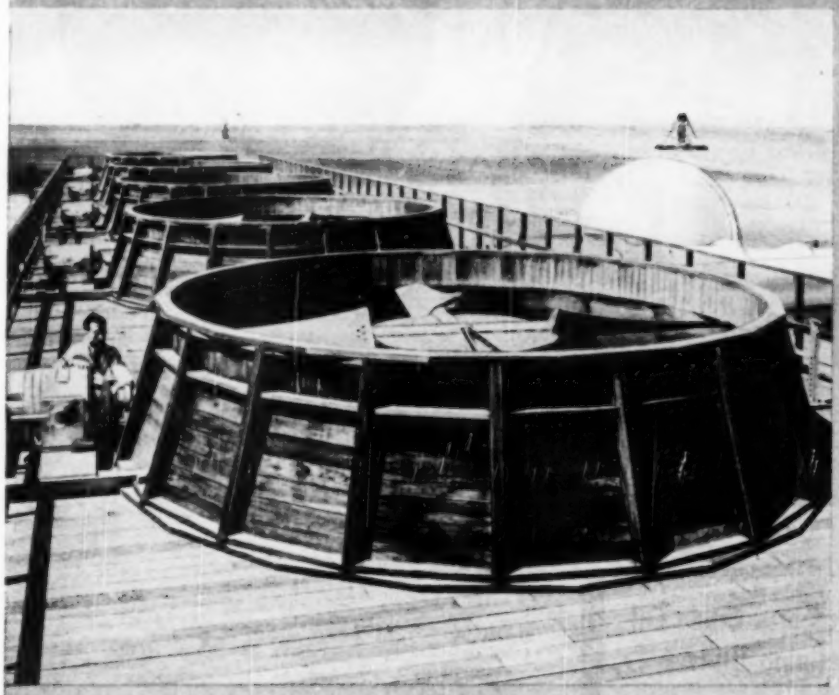
MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

PUMPS — Integral motor and coupled types. Sizes and ratings to 2500 GPM.

FOSTER WHEELER COOLING TOWERS

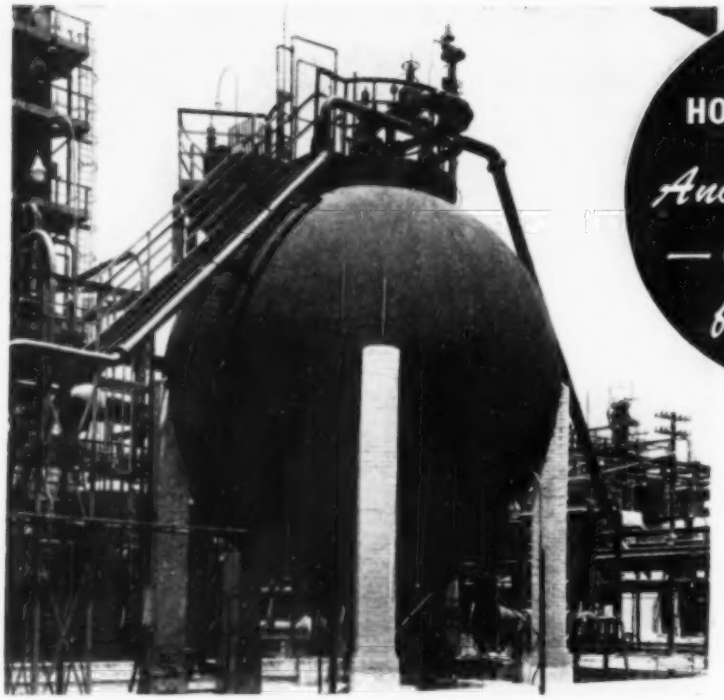
on many landscapes—in many climates



The cooling tower shown here serves the high speed engines operating the 6 by 6 foot supersonic wind tunnel of the NACA's Ames Aeronautical Laboratory at Moffet Field, California. It is an induced draft type of tower which was designed by Foster Wheeler engineers for high efficiency in cooling. The flexibility of this design, now standardized, enables Foster Wheeler to engineer and erect cooling towers for the requirements of any load anywhere in the world.

FOSTER WHEELER CORPORATION
165 Broadway · New York 6, New York

FOSTER WHEELER



THE HORTONSPHERE

Another new job — and looking for more!

Desalter Prepares Crude Oil for Refining Units

The electric desalting process removed approximately 90 percent of the salt from crude oil. This—

1. Reduces the salt accumulation in refining units.
2. Cuts down the corrosion from evolved HCl.
3. Keeps sand, silt, rust and slugs of water from entering refinery units with the crude.
4. Prevents formation of hard, flinty coke in furnaces.

By using the Electrosphere, refineries are able to operate for longer periods with less down time. Heat exchange efficiency is increased and higher furnace temperatures can be used for deeper cracking.

The crude oil desalter shown above, known as the ELECTROSPHERE, is a combination of electric desalting equipment and a 22-ft. diam. HORTONSPHERE—the familiar pressure container used throughout the petroleum industry for the storage of volatile liquids. In addition to petroleum storage, the Hortonsphere also does a number of jobs in other industries, storing such products as hydrogen, anhydrous ammonia, and carbon monoxide. The advantages of this versatile storage tank include simplicity and dependability of operation, low maintenance cost, minimum interior corrosion, and very low fire hazard.

If you have a problem in storing or handling volatile liquids, consider the use of the Hortonsphere. For full information, call or write our nearest office.

CHICAGO BRIDGE & IRON COMPANY

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Chicago 4.....2124 McCormick Bldg.
Cleveland 15.....2220 Guilhall Bldg.
Detroit 26.....1503 Lafayette Bldg.
Havana.....402 Abreu Bldg.
Houston 2.....2103 National Standard Bldg.
Los Angeles 14..1505 General Petroleum Bldg.
New York 6.....3318—165 Broadway Bldg.
Philadelphia 3...1625—1700 Walnut St. Bldg.
Salt Lake City 1.1505 First Security Bank Bldg.
San Francisco 11...1222—22 Battery St. Bldg.
Seattle 1.....1305 Henry Bldg.
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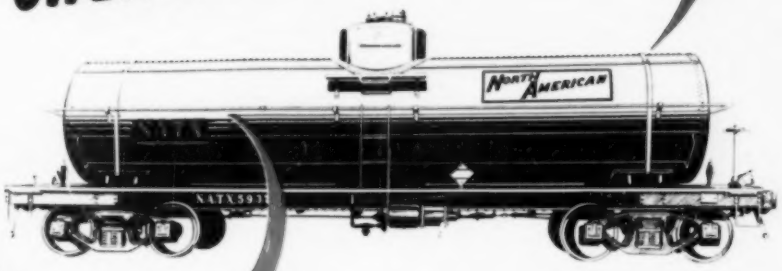
Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PENNSYLVANIA

THIS SYMBOL MEANS SAFETY FOR CHEMICAL SHIPMENTS



This symbol also means service and dependability. It stands for all the helpful transportation knowledge that North American Car has acquired through more than forty years of supplying specially designed tank cars to leading chemical shippers. It is a guarantee of safe, economical railroad shipping.

Do you now have products shipped in drums that have reached tank car capacity? Discuss this with us.

NORTH AMERICAN CAR CORPORATION

NORTH WESTERN REFRIGERATOR LINE COMPANY

A nation-wide organization with branch offices in important market centers

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25 MILES OF PIPING
for Solvent Recovery

NOTICE
MAINTENANCE PROHIBITED
(STRICTLY ENFORCED)

Twenty-five miles of "maintenance prohibited" stainless steel and carbon steel piping. That's what is required to carry highly inflammable, odoriferous, and corrosive printing ink solvent in the recovery system of The Philadelphia Inquirer's new rotogravure printing plant. This piping has to be "maintenance prohibited" because, for safety reasons, the stainless piping is jacketed in carbon steel piping and embedded in sand and concrete. Nothing could test the dependability of piping more. This called for the pipe engineering "know-how" that we have acquired during the past 50 years. In addition, for the past 30 years we have pioneered in developing methods for welding and shop pre-fabrication of stainless steel piping and today, we use the latest "inert-gas-shielded-arc" welding, only recently available for commercial users. For carrying dangerous or corrosive process material you can get the same satisfaction and forget maintenance by contracting us to give you a thorough pipe engineering job.

1899 . . . . OUR 50th YEAR 1949

REPRESENTATIVES IN BOSTON, NEW YORK, CLEVELAND, MOBILE AND HAVANA

WESTPORT JOINT

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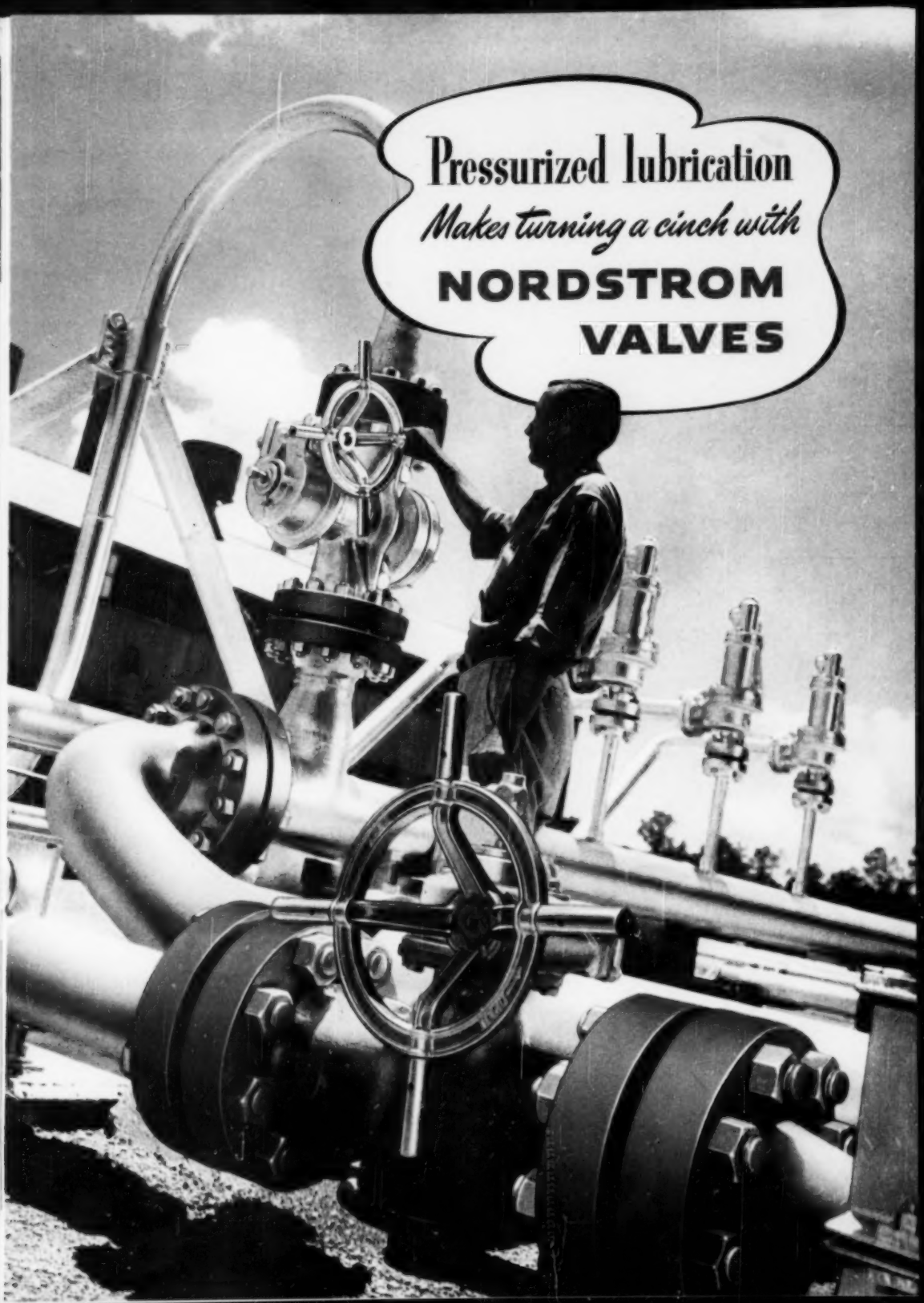
SINCE 1899

MITCHELL

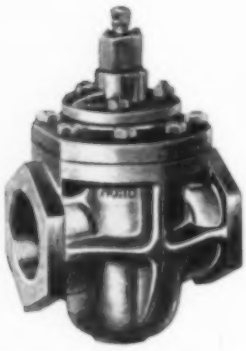
PIPING FABRICATORS AND CONTRACTORS


Pressurized lubrication
Makes turning a cinch with
NORDSTROM
VALVES

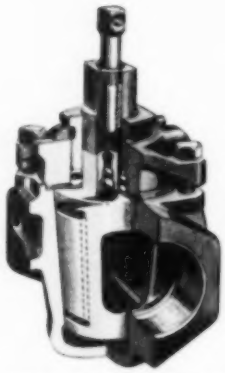
YOU CAN GET THE **RIGHT** VALVE FOR THE *SPECIFIC SERVICE*

— from Nordstrom

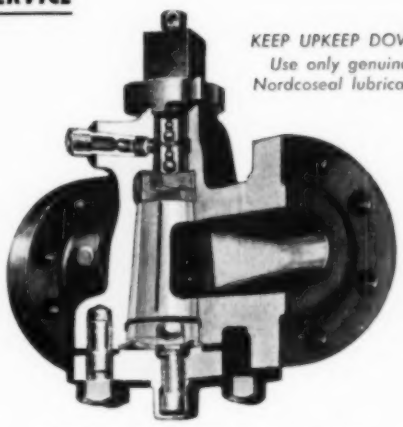
KEEP UPKEEP DOWN
Use only genuine Nordcoseal lubricants



STANDARD TYPE, *Bolted Gland*



STANDARD TYPE, *Screwed Gland*



HYPRESEAL TYPE, *Bolted Bottom Cover*
Sizes ½" to 30"

Nordstrom

LUBRICATED ROCKWELL VALVES

Sealsport Lubrication

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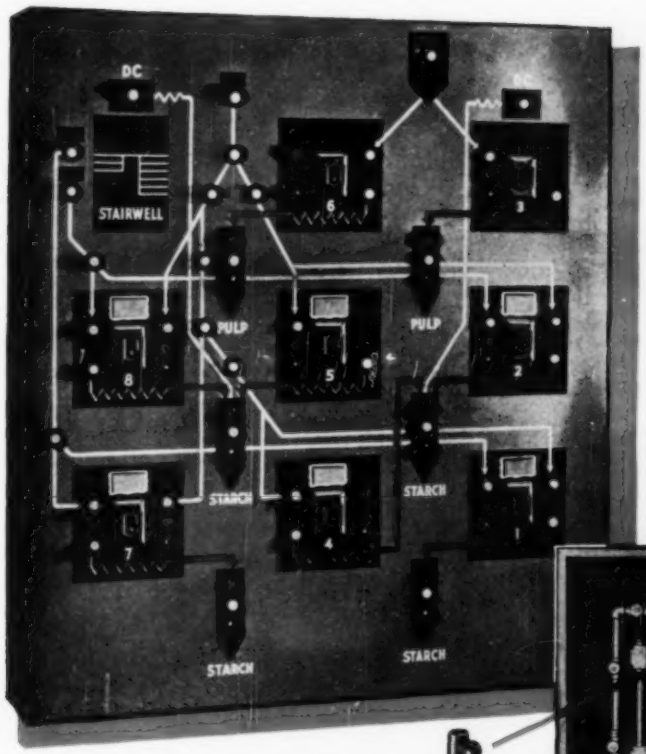
Atlanta • Boston • Chicago • Houston • Kansas City • Los Angeles • New York • Pittsburgh • San Francisco • Seattle • Tulsa • and leading Supply Houses
Export: Rockwell International Corporation, 7701 Empire State Bldg., New York 1, N. Y.

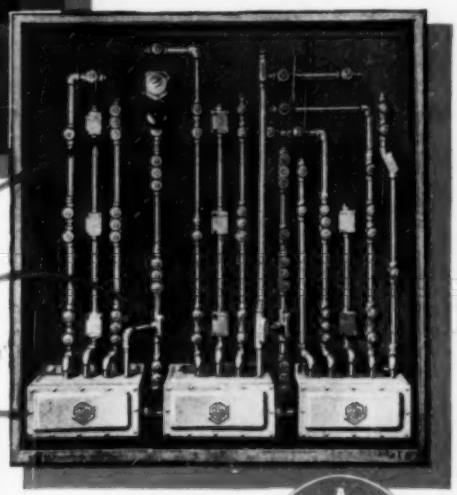
Central flow-line boards for the control of modern industrial processes

are easy to design with CROUSE-HINDS complete line of panel mounting *CONDULET equipment for hazardous locations



Crouse-Hinds panel mounting pilot lights and switches provide visual indication of process stages and instant control of processing or manufacturing equipment. The illustrations show front and back views of a flow-line control board in a starch plant where combustible dust creates a Class II (National Electrical Code) hazardous location.

*CONDULETS are made only by CROUSE-HINDS



Type EYS Explosion-Proof Sealing Condulet

Type GUAT Explosion-Proof Junction Condulet

Type EJB Explosion-Proof Junction Condulet

The pilot lights and switches are dust-tight and explosion-proof and are designed for both Class I and Class II hazardous locations. A similar control board for use where flammable gases or vapors create a Class I hazardous location would only require substitution of explosion-proof junction Condulets and the addition of explosion-proof sealing Condulets, as indicated.

Write for additional information.

A Nationwide Distribution Through Electrical Wholesalers

CROUSE-HINDS COMPANY

Syracuse 1, N. Y.

Offices: Birmingham — Boston — Buffalo — Chicago — Cincinnati — Cleveland — Dallas — Denver — Detroit — Houston — Indianapolis — Kansas City — Los Angeles — Milwaukee — Minneapolis — New York — Philadelphia — Pittsburgh — Portland, Ore. — San Francisco — Seattle — St. Louis — Washington. *Resident Representatives:* Albany — Atlanta — Charlotte — New Orleans

CROUSE-HINDS COMPANY OF CANADA, LTD. *Main Office and Plant:* TORONTO, ONT.

CONDULETS • TRAFFIC SIGNALS • AIRPORT LIGHTING • FLOODLIGHTS

How You Can REDUCE
TUBE REPLACEMENT COSTS
by Using Carpenter Stainless Tubing

Ozone generator with glass tubes fitting concentrically inside of Stainless Tubes. Because tube replacement would involve extremely high costs, straightness, ovality and I.D. tolerances were held to close limits. Carpenter Stainless Tubing, as supplied from distributor stocks, was specified for all ozone units.

Uniform walls in every length provide a tight fit for pressure or vacuum jobs. There are no "off gauge" sections of the tube wall to give corrosion a foothold. The smooth I.D. and O.D. surfaces of Carpenter Stainless Tubing resist the formation of scale and sludge. That means longer tube life.

To reduce your tube replacement costs, send your next order to your Carpenter Stainless Tubing Distributor. One order to Carpenter will convince you that our method of manufacture can save you money on Stainless Tubing jobs.

THE CARPENTER STEEL COMPANY
Alloy Tube Division · 105 Springfield Road, Union, N. J.

STAINLESS TUBING DATA IMMEDIATELY AVAILABLE

For useful information to help you in the selection and use of Stainless Tubing, ask for the 12-page Carpenter Data File Folder. A note on your company letterhead will start this corrosion resistance, physical property and engineering data on its way to you.

24-Hour Service—You get *definite* delivery information within 24 hours when you call your Carpenter Stainless Tubing Distributor.

Carpenter
STAINLESS TUBING
"MORE THAN CORROSION RESISTANCE"

You get MORE CAPACITY with a FANMIX BURNER

Increase Boiler Ratings On Present Or Planned Equipment

In all types of Coppus-Dennis FANMIX Burners — straight gas or combination gas-oil — we utilize the energy of the fuel under pressure to drive the burner fan and deliver air in the proper proportion to the fuel flow. This exclusive "pinwheel action" *mechanically* mixes fuel and air in exactly the right proportions for truly radiant, non-luminous heat.

The result is uniform temperature everywhere in the combustion chamber — no drifting "hot spots" — and complete combustion under all conditions. That's why you can release more heat into your present furnace — why in new installations you get more heat into smaller furnace space.

FANMIX Saves On Both Old and New Installations

FANMIX can easily be operated with your present furnace and stack, requiring only minor changes in other equipment. Or if you're planning on new boilers, remember that FANMIX relieves the furnace from the burden of mixing, creates its own forced draft and takes smaller pipe sizes. Which means you can plan on reduced combustion space, less stack, no forced draft equipment and lower installation costs all around.

Get the Whole Story

Coppus engineers FANMIX Burners to meet individual requirements, providing complete control over heat pattern and combustion . . . Learn more about how "pinwheel action" can step up *your* boiler performance to peak efficiency and economy — as it is doing throughout industry. Send for Bulletin 410-6. Coppus Engineering Corp., Worcester 2, Mass. Sales Offices in THOMAS' REGISTER. Other Coppus "Blue Ribbon" Products in BEST'S SAFETY DIRECTORY, CHEMICAL ENGINEERING CATALOG, REFINERY CATALOG, and MINING CATALOGS.

COPPUS ENGINEERING CORP.
229 Park Ave.
Worcester 2, Mass.
Please send Bulletin 410-6 to:
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★ A long life clearly predicted . . . Thanks to Hackney construction!

Long life and Hackney 2-Piece Acid Drums are synonymous—thanks to Hackney design and construction. First of all, seamless cold drawn construction means a stronger container. Then, there are no longitudinal or chime seams—just a single circumferential butt weld located between and protected by two I-bar rolling hoops.

Add to this sturdy construction special heavy forged spuds to eliminate bung failures. Then, add reinforced chime protectors for extra strength and prolonged life. And then to increase resistance to corrosion, the finished container is stress relieved in automatic time and temperature controlled furnaces.

That's why Hackney Drums make so many extra trips—why they are such economical containers.

Write for full details on Hackney 2-Piece Acid Drums

Hackney

PRESSED STEEL TANK COMPANY

Manufacturers of Hackney Products

1447 South 66th Street, Milwaukee 14, Wis.

1325 Vanderbilt Concourse Bldg., New York 17 — 203 Hanna Building, Cleveland 15

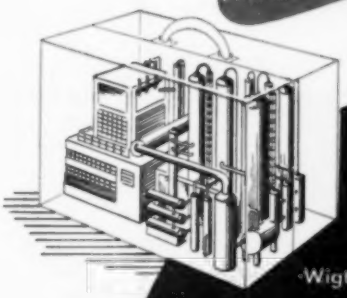
208 South LaSalle Street, Room 2070, Chicago 4 — 553 Roosevelt Bldg., Los Angeles 14

CONTAINERS FOR GASES, LIQUIDS, AND SOLIDS

A NEW CONCEPT IN PLANT CONSTRUCTION...

"PACKAGED PLANT CONSTRUCTION"

A Complete Service from PLANNING to PRODUCTION



It is a service by Wigton-Abbott Corporation that broadens the definition of plant construction to include creation of the process, designing and installation of equipment, and "delivers" the complete plant, ready for operation.

To perform and to coordinate these complex functions, Wigton-Abbott Corporation employs the experience and skill of engineers and architects—including specialists in all branches of chemical, mechanical, electrical, civil and industrial engineering. The Construction Department is staffed and equipped to erect any type of industrial plant.

A Wigton-Abbott Corporation representative will be glad to consult with you on any phase of plant design and construction.

Yours for the asking...

Reading time, only 10 minutes—but it will save you many hours by answering basic questions.

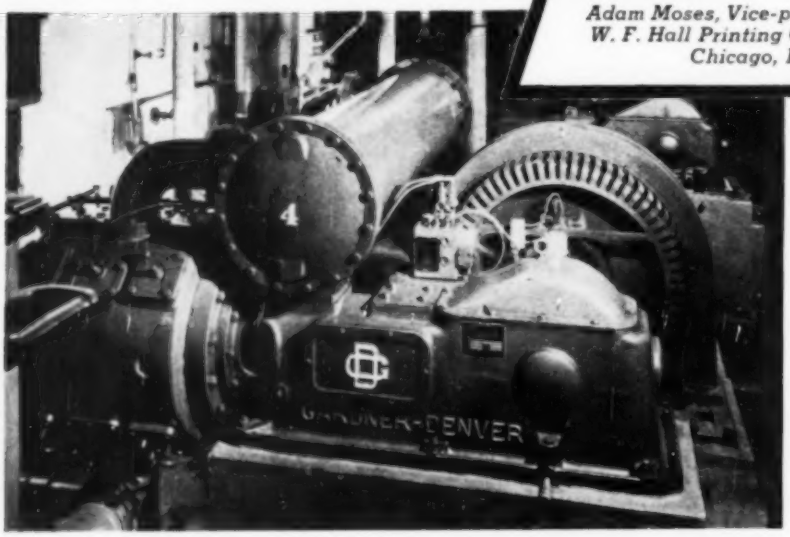
Wigton-Abbott Corporation

DESIGNERS...ENGINEERS...CONTRACTORS...PLAINFIELD, NEW JERSEY

NO STOPS... NO REPAIRS...
In more than two years!

"For the past two years our Gardner-Denver compressor has operated under approximately 100% load for 24 hours a day, seven days a week . . . overall performance has been exceptionally satisfactory."

Adam Moses, Vice-pres.
W. F. Hall Printing Co.
Chicago, Ill.



A Gardner-Denver HAB 13½ & 8 x 8 two-stage, horizontal compressor in the W. F. Hall Printing Co. plant, Chicago.

Continuous operation! Yet this Gardner-Denver Class "HA" Horizontal Compressor has required *no repairs other than minor adjustments* in more than two years. Accurate flow meter equipment indicates no variation in compressor output. Volumetric efficiency remains high . . . horsepower requirements low. Here are some "HA" features that explain this uninterrupted service record:

For complete information, write
Gardner-Denver Company

★ **AIR CYLINDERS** oiled by force-feed lubricator with separate and adjustable feed to each cylinder. Large and unrestricted valve and port areas result in low velocities and minimum friction losses.

★ **TIMKEN ROLLER MAIN BEARINGS** eliminate shaft friction and wear—provide permanent rigidity with freedom from bearing vibration, pounding and side thrust.

★ **LARGE WATER JACKET** areas for cooler running . . . lower discharge temperatures and lubricating economy.

★ **HEAVY-DUTY SIDE CRANK** type main frame of massive design—heavily ribbed and reinforced to give maximum strength and rigidity.

★ **DUO-PLATE CUSHIONED VALVES** for high delivery capacity.

GARDNER-DENVER

Gardner-Denver Company
Quincy, Illinois

In Canada: Gardner-Denver Company (Canada) Ltd., Toronto, Ontario

Since 1859

five

profitable new uses for Ion Exchange

removal *of*
undesirable impurities
from solutions

concentration *of*
valuable substances to
make their recovery
commercially profitable

separation *of*
desired substances
from each other

substitution *of*
specific ions for
other ions in solution

catalysis *of*
chemical
reactions

put them to work for you!

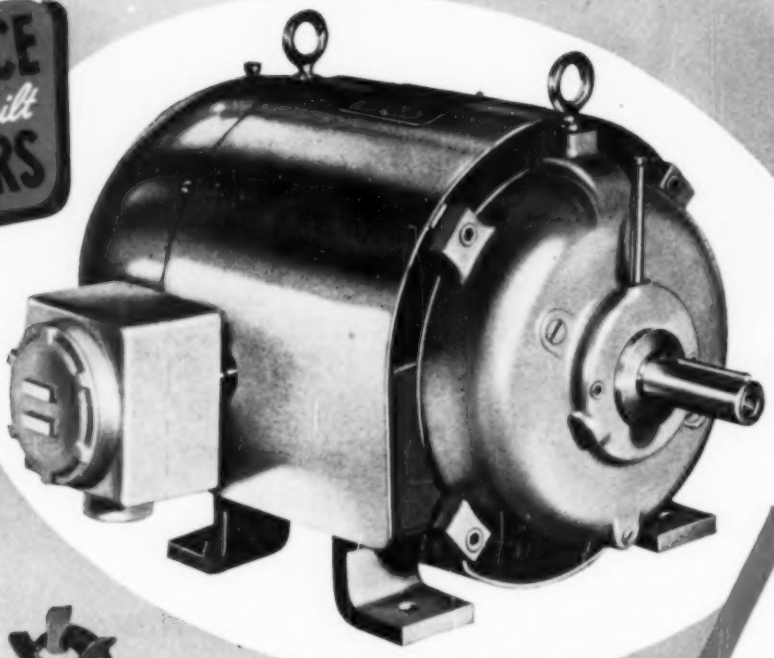
Thanks to Permutit pioneering, industry is today finding many *new* uses for ion exchange, beyond the field of water treatment. Permutit's Ion Exchangers are at work in sugar manufacturing, organic compound recovery, metal recovery, the manufacture of vitamin extracts, the recovery of valuable pectin from grapefruit wastes, and many other fields. In the removal of valuable or harmful metallic ions, ion exchange has made possible recoveries as high as 97%!

Those are only a few of the new developments; many other ion exchange applications appear promising. Why not put this profitable unit process to work in your own industry? Permutit is the only manufacturer of all types of ion exchangers and the equipment for their use. For further details, write to The Permutit Company, Dept. *CE-9*, 330 West 42nd Street, New York 18, N. Y., or to the Permutit Company of Canada, Ltd., Montreal.

PERMUTIT®

WATER-CONDITIONING • ION EXCHANGERS • MATERIALS AND EQUIPMENT

RELIANCE *Precision-Built* MOTORS

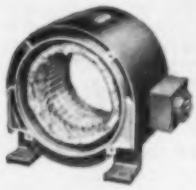


FAN COVER *is made of* Monel metal for the unusual corrosion-resistance which distinguishes this special alloy. Of one-piece construction with stamped air inlets.

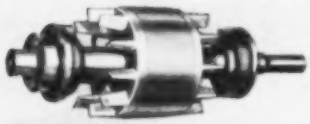
FAN, ribbed for strength, is a heavy, non-sparking casting of leaded bronze with very low zinc content. Effectively moves a liberal volume of air through circulation passages.

BEARING BRACKETS, interchangeable end-for-end, are of cast iron with longer lips for greater bearing protection. Walls are extra thick, tolerances held closer on diameters.

BRACKETS have heavy inner ribs to provide rigidity and increase radiating surfaces of motor. Countersunk holes for socket-head screws are outside continuous rabbet fit between brackets and frame to assure precision bearing support and an accurate, complete seal.



STATOR has outer cover of corrosion-resisting Monel metal. Core of electrical sheets is welded in place within heavy ¼-inch steel enclosing shell. Tubular frame construction with fabricated steel feet provides rigid support.



PRESSURE-CAST ALUMINUM ROTOR provides integral rotor bars, short circuiting rings and fan blades. Core of electric silicon steel precision punched for greatest efficiency. Slots skewed for quiet operation, uniform starting torque.

. . . and all these ADDITIONAL points of protection!

- Lead outlet has Monel metal pipe nipple running directly into inner shell enclosing stator. All joints sealed. No gaskets to be replaced.
- Hex socket type bracket assembly screws of heat-treated steel to meet strength requirements for explosion-proof specifications.
- Fan cover screws are made of Monel. Bolts holding outer fan, partially protected by location, are of cadmium-plated steel.
- Special "fit-up" compounds used between frame and end brackets to minimize possibility of corrosion and seizing.
- Monel shaft collars afford added protection to bearings and lubricant in grease chamber.

RELIANCE
EXPLOSION-PROOF
CORROSION-RESISTING
MOTOR

Here's a motor specially designed and built for longer life . . . .

This Reliance Motor combines special materials and precision construction to set exceptionally high standards of performance in locations where it is exposed to corrosive chemicals, fumes, moisture, dripping oil or dust.

From Monel frame and fan covers to asphaltum-treated bracket screws, it has been designed and precision-built in every detail to cope with the corrosive elements found in chemical and related processing industries today.

This Reliance PRECISION-BUILT Motor is also available with Underwriters' Label for Class 1, Group D, which sets the standards for motors to be operated in hazardous conditions created by gasoline, petroleum, naphtha, alcohols, acetone, lacquer, solvent vapors or natural gas.

If premature motor failure has cut your efficiency and upped your costs, it will pay you to have all the facts on the *extra* protection built into Reliance Explosion-Proof, Corrosion-Resisting Motors. Write today for Bulletin C-130 which describes frames 203-326 for two and three phase alternating current circuits.

* * *

It will also pay you to have information on other Reliance PRECISION-BUILT A-c. Motors; ask for bulletins describing the complete line. There is a type to meet every requirement from 1 to 300 horsepower — with advantages that have been proved to users in every industry.

Sales Representatives in Principal Cities

RELIANCE ELECTRIC AND ENGINEERING CO.

"Motor-Drive is More Than Power" • 1063 Ivanhoe Road, Cleveland 10, Ohio

How Darling features prevent trouble and expense

EXTREME SIMPLICITY

THAT'S all there are—just four simple, sturdy parts—two plain interchangeable no-pocket discs and two husky wedges.

Note particularly that the discs are completely free of pockets. Sediment and scale cannot collect to interfere with their free movement. No links or other devices are needed to hold the discs and wedges together. Any part can be quickly and inexpensively replaced without removing valves from the line. Parts cannot be incorrectly assembled nor become disengaged while in service. Operation and maintenance are equally simple.

Darling valve users are money ahead because of the exceptional service made possible by the ingenious simplicity of the Darling design. These advances, coupled with Darling's modern precision manufacturing methods and advanced metallurgical practice, offer you valve performance at its finest . . . and at the lowest cost. Next time give Darling a try!

DARLING VALVE & MANUFACTURING CO.
WILLIAMSPORT 3, PA.

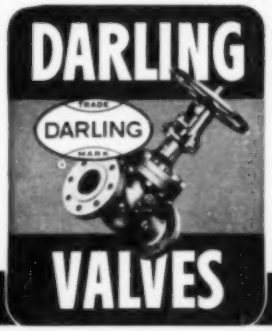
"This advertisement is one of a series showing how the unique Darling Fully Revolving Double Disc Parallel Seat Gate Valves answer the following critical operating problems:

- Positive, easy closing—regardless.
- Automatic adjustment for valve body distortion.
- Elimination of disc-to-seat friction and galling.
- Uniform wear distribution.
- Extreme simplicity.
- Greater service life.
- Simplified maintenance.

CORROSION RESISTANT VALVES

In addition to conventional iron, bronze and steel constructions, Darling specializes in valves for any corrosive fluid: iron body valves with special alloy trim; iron body, rubber lined, with special alloy trim; all bronze; and all special alloy. Darling's 50 years of experience in meeting unusual requirements is always at your service.

Outline your service requirements and get complete information on Darling Valves of the proper type. Or, send for the complete 300-page Darling Catalog No. 17M. It describes Darling Valves of all types for every normal or unusual service, and for pressures up to 1500 pounds. It's full of helpful information . . . Yours for the asking.



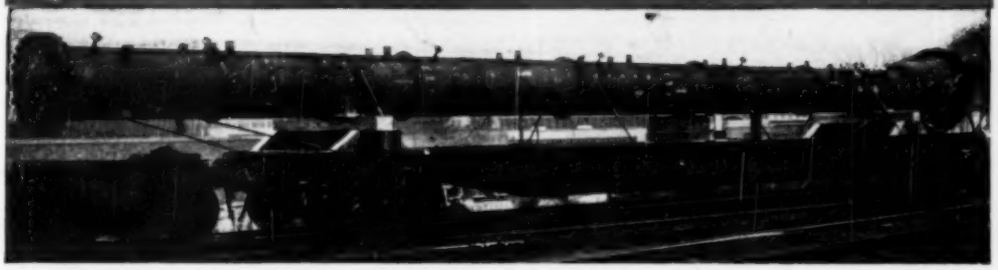
THE VALVE MARK OF QUALITY . . . WATCH FOR IT

VESSEL DIVISION

NEWS

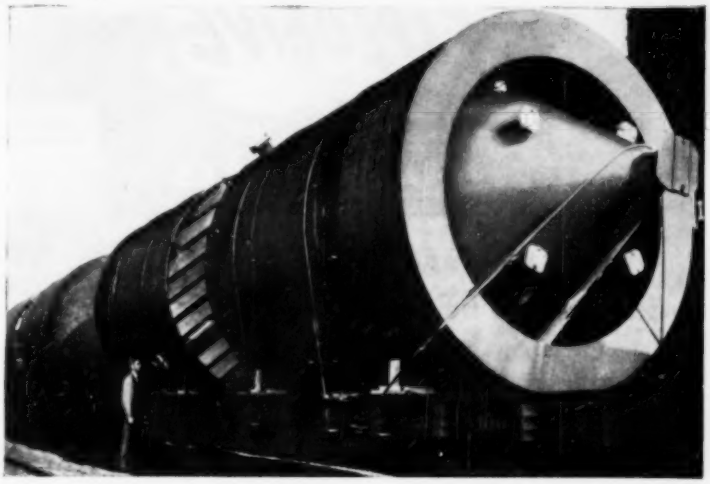
A. O. SMITH Corporation

New York 17 • Philadelphia 5 • Pittsburgh 19 • Atlanta 3 • Chicago 4
Tulsa 3 • Dallas 1 • Houston 2 • Seattle 1 • Los Angeles 14
International Division: Milwaukee 1

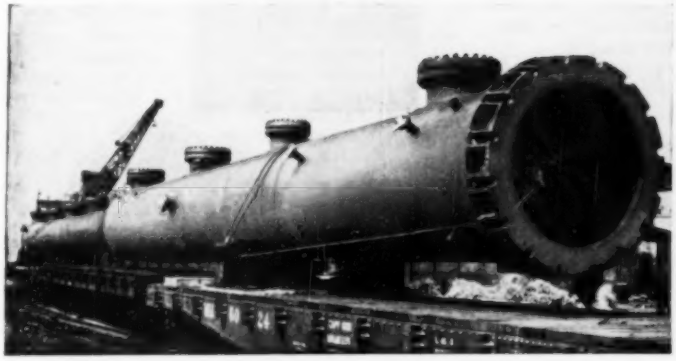


INTO EVERY SMITHlined FAT-SPLITTING TOWER, like the above 68-ft.-long SMITHway Tower, goes the experience and knowledge gained from a long and extensive program of research and development into the corrosion problems of the Fatty Acid Industry.

THREADING A NEEDLE. Getting a 12 ft. dia. by 43 ft. long paper mill replacement digester into an existing building is a difficult feat. A. O. Smith did it by shipping the SMITHlined Digesters *in sections* for final assembly and welding in place inside the paper mill.



A. O. SMITH MAKES ALL TYPES OF OIL-REFINING PRESSURE VESSELS. Here is one type, a SMITHlined Absorber Tower three railroad cars long (approximately 107 ft. long), leaving for a refinery in Ohio.



NEW BULLETINS

Write the nearest A. O. Smith office listed at the top of this page for these new A. O. Smith Bulletins:

FIELD ASSEMBLY OF PRESSURE VESSELS—Bulletin V-44.

SMITHway VESSELS, Alloy, Alloy-Lined, Clad, and Glass-Lined—Bulletin V-46.

SAFE STARTERS for EXPLOSIVE ATMOSPHERES

A-B starters and push buttons in NEMA Type 7 Enclosures in paint room of Wadsworth Electric Mfg. Co., Covington, Kentucky.

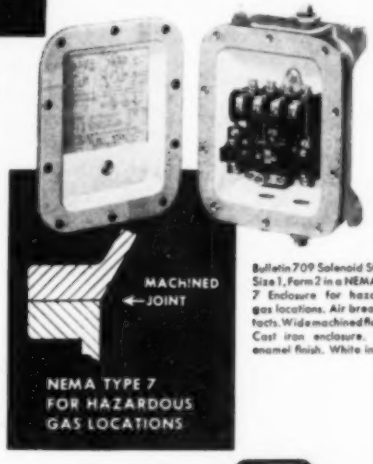
Protect Men and Equipment with NEMA Type 7 Enclosures

Where hazardous gases or vapors exist, install Allen-Bradley motor controls in NEMA Type 7 Enclosures. Constructed of cast iron with wide machined flanges, these bolted enclosures provide maximum protection.

These starters are also available in enclosures for wet locations, hazardous dust, and corrosive atmospheres.

Allen-Bradley solenoid starters are ideal for bolted enclosures, because their double break, silver alloy contacts need no maintenance. Only one moving part—no pins, pivots, bearings, or jumpers to cause trouble.

Allen-Bradley Co., 1337 S. First St., Milwaukee 4, Wis.



Bulletin 709 Solenoid Starter, Size 1, Form 2 in a NEMA Type 7 Enclosure for hazardous gas locations. Air break contacts. Wide machined flanges. Cast iron enclosure. Gray enamel finish. White interior.

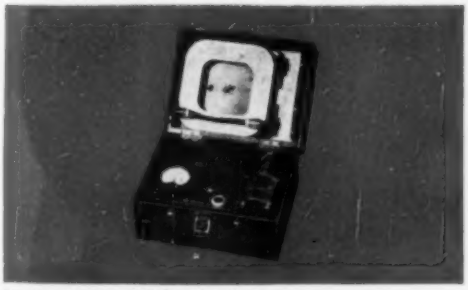
ALLEN-BRADLEY SOLENOID MOTOR CONTROL

QUALITY

A-B Quality

HERE'S HELP FOR YOUR TESTING AND MEASURING PROBLEMS

Use one of these 3 instruments... or select from more than 300 other G-E stock instruments

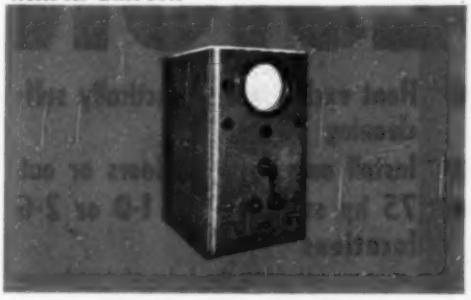


To Cut Costs of Balancing Rotors

—use the G-E portable dynamic balancer

By using the G-E portable dynamic balancer to balance rotors in their own bearings, you can drastically reduce the time and cost of balancing rotors in generators, motors, and in other machines. One operator alone can balance two-bearing machines, and he needs to make only three runs.

Ideal for factory-testing, you can use the device for installation or maintenance work, and for field service on any rotor within a speed range of 600 to 6000 rpm and weighing more than 30 pounds. Write for GEA-320.



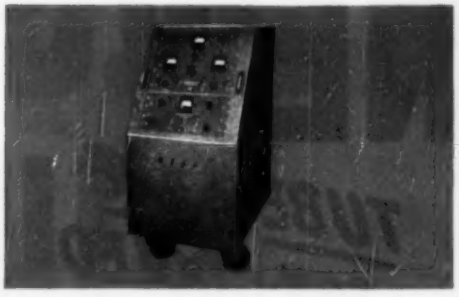
To Detect Insulation and Winding Faults Quickly

—use the G-E winding-insulation tester

You can speed up production-line testing of motors, transformers, and generators by using the G-E winding-insulation tester. At one G-E plant, for example, more than 4000 motors a week are tested with one device.

Less than one minute is required for a complete test, which includes resistance, impedance, turn-balance, and complete high-potential tests. The operator can determine the nature of the defects by the wave shapes of the oscillograms. Write for GEC-321.

You may find that General Electric engineers can help you by recommending one of the many G-E stock devices and instruments. Your problem, especially if it is one common to industry, may even justify developing new equipment. Send the coupon today to Apparatus Department, General Electric Company, Schenectady, N. Y.



To Locate Leaks in Closed Systems

—use the G-E Type M Leak Detector

By locating even the smallest leaks while your products are on the production line, you reduce operating costs, cut service expense in the field—and safeguard the good will of your customers. Used in G-E refrigerator production for more than two years, the Type M detector uses helium as a tracer. The detector is so sensitive that it can detect one part of helium in 200,000 parts of air. Write for GEC-336.

FOR HELP on your Testing Problems . . . Mail this coupon today to:

General Electric Company
Section B687-16
Schenectady 5, N. Y.

Please send me descriptive information on instruments that will help me to test .....

.....

.....

Name .....

Company .....

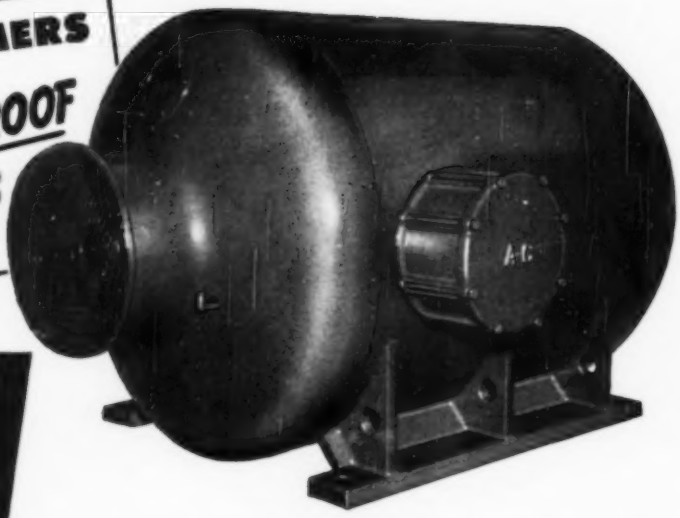
Title ..... Street .....

City ..... State .....

GENERAL ELECTRIC

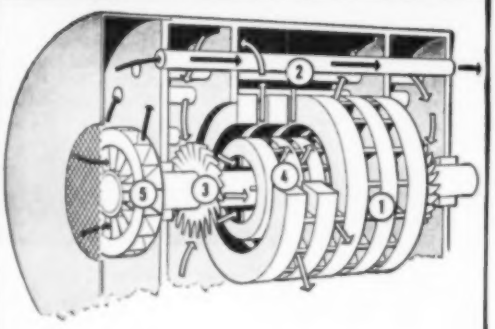
ALLIS-CHALMERS

EXPLOSION-PROOF MOTORS



NEW TUBE-TYPE FAN-COOLED DESIGN

How Tube Cooling Works



Stator core (1) is surrounded by tubes (2). Internal fans (3) circulate air through ducts (4) in rotor and stator and around tubes, transferring heat to tubes. External fan (5) drives outside air through tubes, removing heat and keeping tubes clean. All electrical parts are enclosed. Dirt cannot enter.

- **Heat exchanger is practically self-cleaning**
- **Install anywhere – indoors or out**
- **75 hp and up – for 1-D or 2-G locations**

FOR HAZARDOUS LOCATIONS the design of the tube-type heat exchanger in this Allis-Chalmers explosion-proof motor cuts maintenance costs to a new low. Large heat transfer area plus internal and external forced air circulation removes heat quickly. Cleaning is practically eliminated because the air passages are unrestricted. Air flow through the straight tubes removes foreign matter.

Three years of operation in the field have shown that savings in maintenance can be made with this cooling arrangement. Sizes from 75 to 600 hp carry Underwriter's label. Larger sizes built on special order. Also TEFC* designs for non-hazardous locations. For complete information, outline your requirements to your A-C Sales Office, or write for Bulletins 05B7150 and 51R7149.

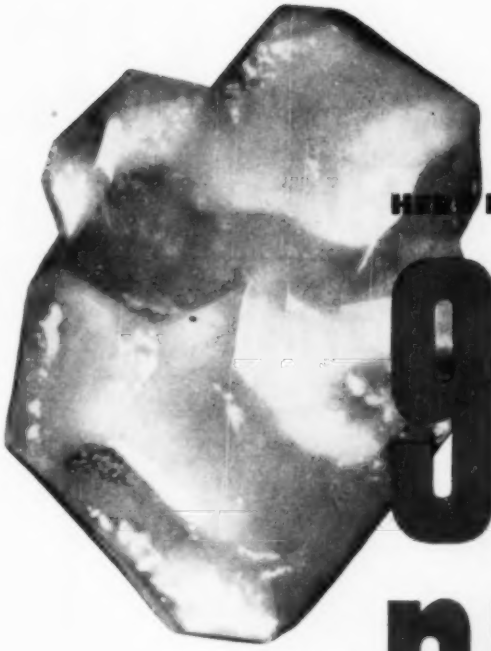
*Totally-Enclosed Fan Cooled

A-2609

ALLIS-CHALMERS, 1147A SO. 70 ST
MILWAUKEE, WIS.

A-C ALLIS-CHALMERS

ALLIS-CHALMERS



HERE IS A SILICA OF TRUE PURITY

99.71% pure*...

Davison Silica Gel

So pure, for example, that run-of-production Davison Silica Gel is used as an anti-caking agent in pharmaceuticals and foodstuffs without further purification.

This high degree of purity, made possible by controlled Davison processing is also valuable in eliminating the danger of contaminating or poisoning reactions when Davison Silica Gel is used as a catalyst or as a cooperative or inert support for catalytically active compounds.

Davison's close chemical control over production results in a material of such high uniformity that operating conditions remain constant for any given reaction, even when the gel is replenished or completely replaced. Such characteristics as mesh size, pore size, internal surface area, and density are controlled according to specifications during production to give you maximum efficiency in your operation.

Write for information and specifications—
Please mention your proposed application.

***TYPICAL ANALYSIS ON A DRY BASIS**

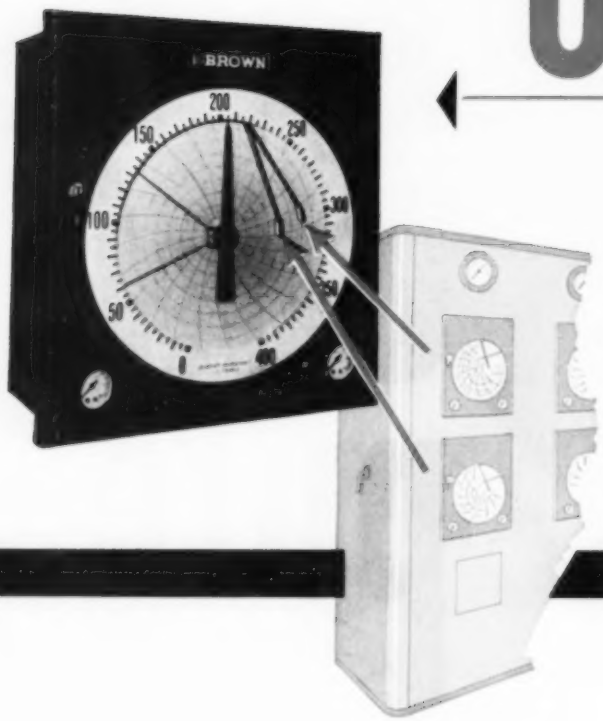
99.71	SiO_2
.03	Fe_2O_3
.10	Al_2O_3
.09	TiO_2
.01	CaO
.02	Na_2O
.01	ZrO_2
.03	Trace Elements

THE DAVISON CHEMICAL CORPORATION

Progress through Chemistry

BALTIMORE-3, MD.

ONE



Call in your local Brown engineer for detailed information, today . . . or write for your copy of Catalog 15-4R for general information on the ElectroniK Air-O-Line Controllers.

INSTEAD OF TWO SAVES PANEL BOARD SPACE...

You get temperature and flow (or pressure) at a single glance

with the *ElectroniK* Recorder-Controller

RELATED data are recorded on one, double range chart. You don't need two charts to get related readings of a process.

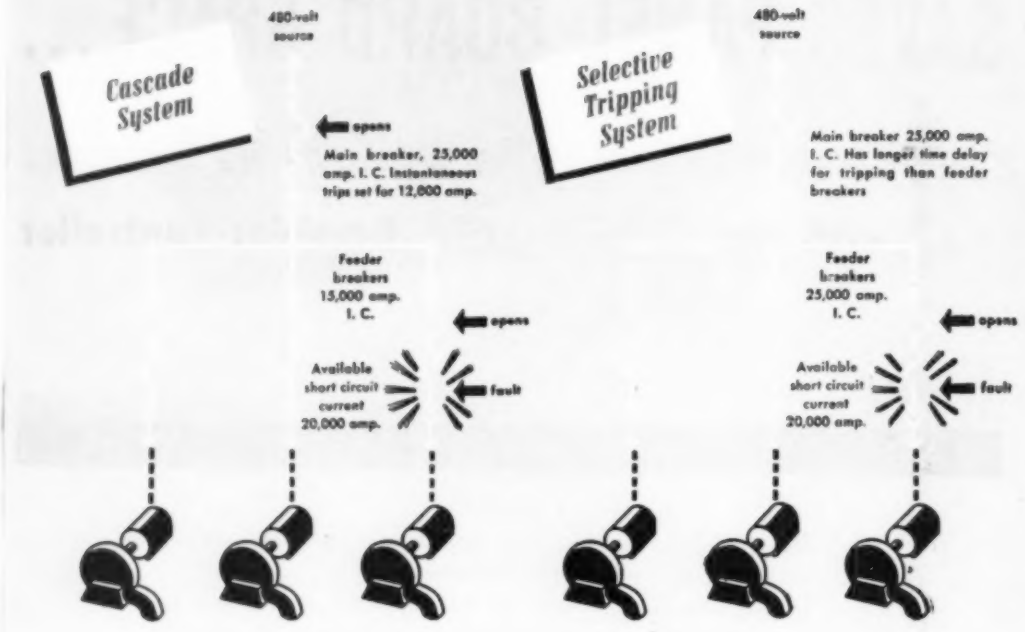
One pen, which controls the temperature, is connected to a thermocouple. The other pen is connected, pneumatically, to a remotely located sensing device . . . to record the other variable that means most to you.

You get the convenience of two records on one chart *plus* temperature control *plus* the economy of using one instrument for two jobs. The *ElectroniK* Potentiometer does the trick . . . with the same top-quality performance and minimum maintenance that have made it famous throughout industry.

MINNEAPOLIS-HONEYWELL REGULATOR CO.
BROWN INSTRUMENTS DIVISION, 4478 Wayne Ave., Philadelphia 44, Pa.
Offices in 73 principal cities of the United States, Canada and throughout the world

Honeywell — *Advanced Instrumentation* FOR THE CHEMICAL INDUSTRY — BROWN INSTRUMENTS

What's the trend in chemical plant electrification? } *. . . better*


480-volt source
Cascade System
opens
Main breaker, 25,000 amp. I. C. Instantaneous trips set for 12,000 amp.
Feeder breakers 15,000 amp. I. C.
opens
Available short circuit current 20,000 amp.
fault
480-volt source
Selective Tripping System
Main breaker 25,000 amp. I. C. Has longer time delay for tripping than feeder breakers
Feeder breakers 25,000 amp. I. C.
opens
Available short circuit current 20,000 amp.
fault

Cascade system is used where service continuity is not a "must." Here the main air circuit breaker is used to assist the feeder breaker to interrupt all faults over 80 per cent of feeder breaker's capacity. Lesser fault currents are interrupted by the feeder breaker alone.

Selective tripping system lets feeder air circuit breakers interrupt *all* fault currents on feeders. Main air circuit breaker opens only for bus faults or because of failure of feeder breaker. Thus, a short circuit in one feeder does not interrupt power to other feeders.

Here's what you need to modernize your power system! }

WHEN YOU COME TO GENERAL ELECTRIC you get far more than the finest in electrical equipment. A General Electric application engineer, familiar with chemical plant practice, is at your disposal. If desired, he stands ready to take over the job of co-ordinating all the needed components, engineering your power distribution into one modern, efficient system.

protection against shutdowns

WITH SELECTIVE TRIPPING

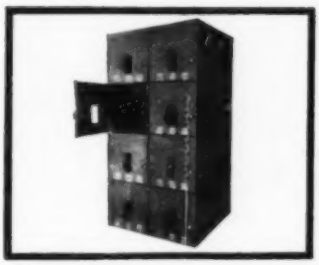
—to isolate faults on low-voltage circuits

Although comparatively new, selective tripping of air circuit breakers is becoming increasingly important in the field of low-voltage power distribution. Especially is this the case in applications—such as continuous processing in chemical plants—that require a high degree of service continuity. By isolating faults at remote points without tripping the main supply breaker, this method eliminates the costly production delays caused by complete power shutdowns.

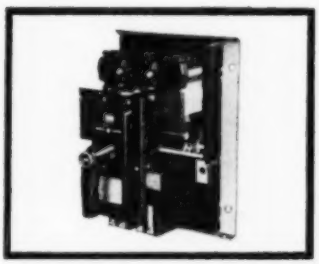
With selective tripping, full interrupting-rating breakers are used throughout, with differently-timed tripping ranges arranged so that the breaker farthest from the power source trips first. Thus, only that portion of the circuit nearest the fault is isolated. The rest of the power system stays in operation, permits uninterrupted production elsewhere in the plant.

For complete information on this new and cost-saving way of protecting your important low-voltage circuits, write for Bulletin GET-1485 "Selective Operation with Air Circuit Breakers." *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

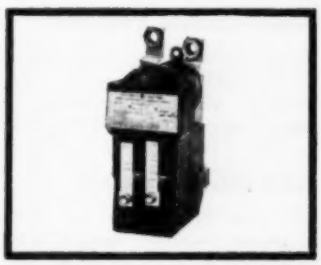
FREE G-E AIDS TO POWER SYSTEM SAVINGS! Here are ideas you can use on how to cut the cost of power distribution—your plant's most critical "materials handling" problem. Offered by General Electric as a service to your industry, they're contained in a full-color sound slidefilm, a factual manual, and a supplementary review booklet. All this is available to you and your organization without charge. Just ask your G-E representative to arrange for a showing of the film "Modern Industrial Power Distribution."



G-E metal-enclosed switchgear, containing air circuit breakers with new trip device, needs less floor space. Features include new rack-out mechanism, improved bus construction.



In the G-E Type AK-1 air circuit breaker (shown here with one trip device removed) you get improved arc interruption, multiple arcing contacts, and interchangeable trip units.



New G-E Type EC-1 tripping device for AK-1 air circuit breakers is sealed to eliminate maintenance, easily adjusted, readily removable for changing trip characteristics.

GENERAL ELECTRIC

For Better Results at Higher Temperatures in Chemical Processes: Pure Oxide Refractories

In its continuous search for refractory products which can be used at higher and higher temperatures, Norton Company has developed a line of pure oxide refractories.

As the term "pure oxide" refractories implies, the raw materials from which the product is made are carefully selected as to source and composition. Raw materials of higher melting points have been searched for and found.

The objective is to mold articles which will contain an absolute minimum of addition agents for bonding purposes and to fire the shapes at sufficiently high temperatures to produce a truly sintered final product.

A variety of pure oxide products have now been developed and successfully used in the field. These include bricks of the 9" and other standard series, large furnace shapes and small furnace shapes and laboratory ware.

The principal raw materials used in the manufacture of Norton pure oxide refractories are Alundum (fused alumina), Magnorite (fused magnesia), fused stabilized zirconia and, to a limited degree, fused thoria.

fused alumina: Alundum

Norton 38 Alundum is used in the manufacture of pure oxide refractories and these shapes contain 99+% Al_2O_3. The melting point is approximately 2000° C. This is an inert substance and the refractory shapes are resistant to chemically active solutions. The shapes are strong, true to size and shape, extremely refractory and with high electrical resistance. Three grades of Alundum pure oxide refractories are available: dense, insulating and impervious.

fused magnesia: Magnorite

Magnorite refractories are made from selected magnesite which is MgO in its densest form. This is a basic refractory material. Magnorite shapes are used largely in lining metal melting furnaces, both ferrous and non-ferrous.

fused stabilized zirconia

This is electrically fused zirconia (ZrO_2) stabilized by CaO to prevent inversions. Two grades are available, a dense grade and an insulating grade. Stabilized zirconia can be used at extremely high temperatures; it is an excellent thermal insulator and it is relatively inert. It does become an electrical conductor at high temperatures. Because of its unusual refractory properties, stabilized zirconia has made possible a number of new manufacturing processes.

fused thoria

Electrically fused thoria (ThO_2) is manufactured in the form of grain and small refractory shapes. This is the most inert of all refractory materials and has the highest melting point (3050° C.) of all the oxides. There are two limitations to its use: it is radioactive and it is very expensive.

grain

High purity Alundum, Magnorite and stabilized zirconia are also available in the form of grain for use as a raw manufacturing material or for thermal insulation. Alundum and stabilized zirconia can be used in either oxidizing or reducing atmospheres. Grains of both high and low thermal conductivity make it possible to control heat loss. The unusually low heat thermal conductivity of stabilized zirconia insulating grain recommends its use when heat saving is a necessity. Its conductivity is similar to the best fire clay insulating material although it can be used at more than twice the temperature.

pure oxide refractories

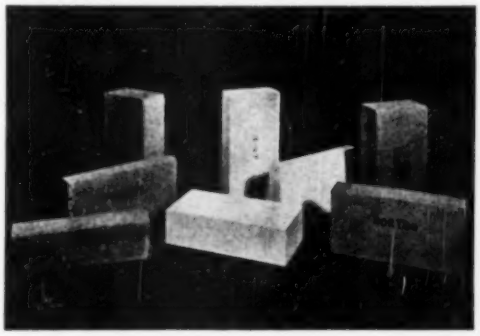
	Alundum			Magnorite		Stabilized Zirconia
	Dense	Insulating	Impervious	Dense	Dense	Insulating
composition Al_2O_3 MgO ZrO_2(+CaO)	99%	99%	98+%	97+%	98%	98%
specific gravity	3.1	1.9	3.7	2.8	4.2	2.8
porosity	22%	53%	7%	21%	25%	50%
thermal conductivity at 2000° F. btu/hr./sq. ft., in./° F.	17	9	estimated 30	18	6	4
melting point	2000° C.	2000° C.	2000° C.	2700° C.	2650° C.	2650° C.
top use temperature*	1950° C.	1850° C.	1900° C.	2300° C.	2500° C.	2000° C.

*Top use temperature depends on application. Temperatures quoted are maximums encountered to date.

NORTON **Norton Company • Worcester 6, Mass.**

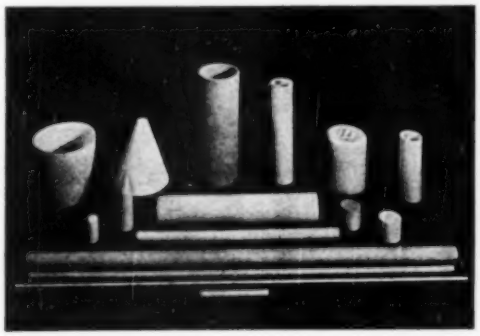
heavy shapes

Industry is continually reaching for new materials, as they make visible new manufacturing horizons. Alundum, Magnorite and stabilized zirconia refractories are serving these needs by their resistance to extremely high temperatures. Standard and special shapes are supplied of Alundum, Magnorite and stabilized zirconia to satisfy most all construction requirements. Blocks, circle brick, hearth plates, rails, muffles, thermocouple blocks, weighing as much as 320 pounds, have been supplied.



bricks

High purity Magnorite, Alundum and stabilized zirconia are available in most brick and special shapes with a variety of physical properties. The high thermal conductivity of dense Alundum makes it ideal for heat transmission. Insulating Alundum, however, is an excellent thermal insulator even at temperatures well above that possible with other thermal insulating materials. Magnesia refractories have the reputation of having low load bearing strength at elevated temperatures. Norton high purity Magnorite, however, has greater load bearing strength than any other known refractory.



laboratory ware

Norton Alundum Laboratory Ware is being used by the ceramist, metallurgist, chemist, glass technologist, and technologists of widely different fields. The high resistance to metal pick-up and high resistance to fusion make them suitable for many severe chemical and thermal applications. Pyrometer tubes and combustion tubes mean longer life and wider operating temperature ranges.

Magnorite and stabilized zirconia ware are not available in all of these shapes and are not impervious. However, they have proved excellent for many applications where this property is of minor importance.

Can't be beat for handling heat!

NORTON®
REFRACTORIES

GAIN DEPENDABLE BREATHING SAFETY

Supplied Air Masks

★ M.S.A. HOSE MASKS: supply fresh air through hose to wearers in confined spaces; hand- or motor-operated blowers.

★ M.S.A. BLASTFOE ABRASIVE HELMET: lightweight protection for the sandblaster. Aluminum headpiece, replaceable rubber hood.

★ M.S.A. AIRLINE RESPIRATOR: uses compressed air for breathing, under exact control, in contaminated atmospheres.

★ M.S.A. ABRASIVE MASK: heavy-duty, durable protection for shot- and sandblast operators.

Oxygen Apparatus

★ M.S.A. CHEMOX: makes its own oxygen—as you breathe—in replaceable chemical canister. 45-minute protection.

★ M.S.A. DEMAND MASK: ½-hour supply of air or oxygen, demand-regulated, with back-carried high pressure cylinder.

★ McCAA TWO-HOUR OXYGEN BREATHING APPARATUS: for rugged, extended service in unbreathable air.

Dust and Fume Respirators

★ M.S.A. DUSTFOE RESPIRATOR: All-Dusts protection. Formable aluminum facepiece, transparent filter container.

★ M.S.A. COMFO RESPIRATOR: twin, large-area filters for all dusts. Comfo cushion facepiece provides airtight seal on face.

★ M.S.A. METAL FUME RESPIRATOR: special filters for protection against harmful metal fumes. Comfo facepiece.

PLUS VITAL WEARING COMFORT—WITH

the *Complete Line* of

RESPIRATORY PROTECTION

for every breathing hazard on any industrial job

★ U. S. BUREAU OF MINES APPROVED

Canister Gas Masks

★ M.S.A. TYPE "S" ALL-SERVICE GAS MASK: protects against smoke and all industrial gases, including carbon monoxide.

★ M.S.A. AMMONIA MASK: specialized safety for refrigerant emergencies and repair, with long-life ammonia canister.

★ M.S.A. INDUSTRIAL GAS MASK: protects against individual gases, with a wide selection of specific canisters.

★ M.S.A. TANK GAUGER'S MASK: supersize canisters for hydrogen sulphide, and other petroleum gases and vapors.

Cartridge Respirators

M.S.A. GASFOE RESPIRATOR: ever-ready protection against light acid gases, organic vapors. Can be worn around neck or carried in pocket.

M.S.A. GAS-FUME RESPIRATOR: multi-purpose type, for light gases, vapors, dusts, fumes. Back-carried, twin replaceable cartridges.

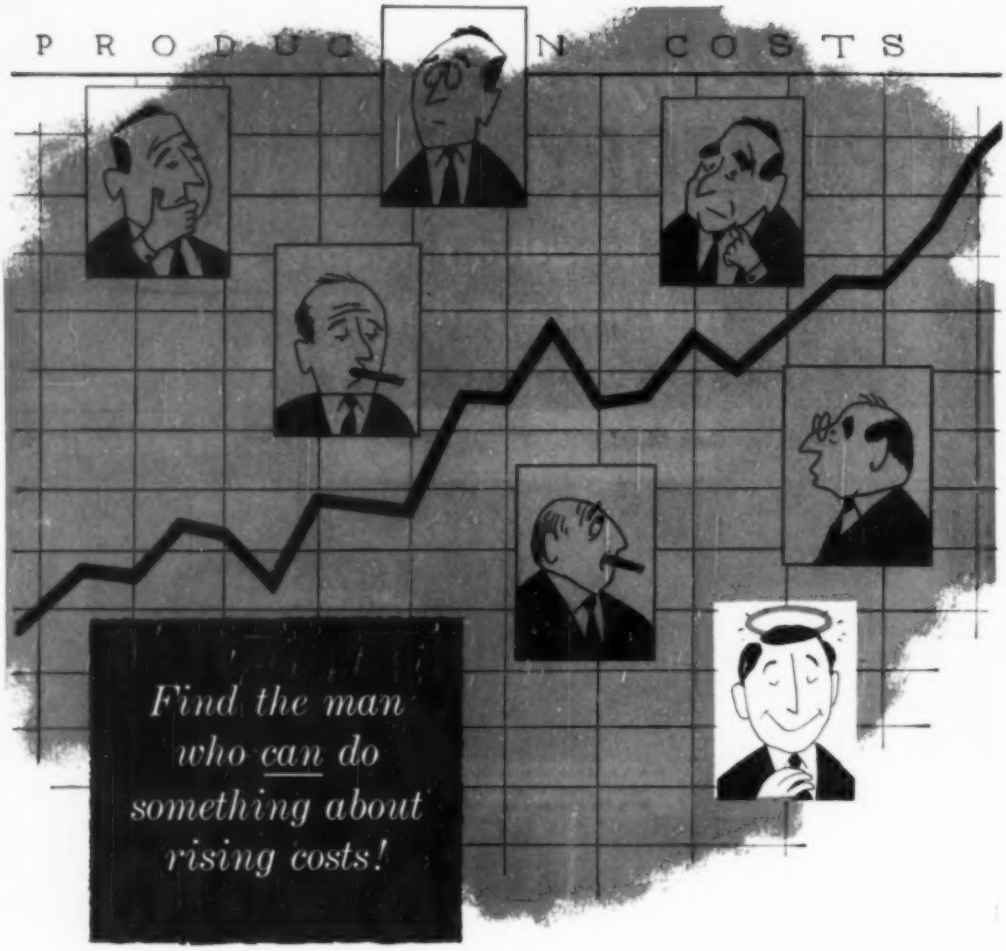
★ M.S.A. CHEMICAL CARTRIDGE RESPIRATOR: twin-cartridge, for paint spray vapor, light acid gases and organic vapors.

MINE SAFETY APPLIANCES COMPANY

BRADDOCK, THOMAS AND MEADE STREETS · PITTSBURGH 8, PA.

At Your Service:

54 BRANCH OFFICES IN THE UNITED STATES AND CANADA



In this day of upward spiraling operation costs, there's one man who can effect production economies. He's the man whose responsibility is getting the most heat and power from each fuel dollar expended. He knows that you get maximum efficiency from Eagle-Picher Industrial Insulations — because they're durable, chemically and physically stable, water-repellent *mineral wool*. They give long years of service, and are easy to maintain, economical to replace. There's an Eagle-Picher Insulation that can help reduce *your* operating expenses!

Let these Eagle-Picher products save you money . . . power . . . time

Insulating Felts
Supertemp Block • Blankets
Loose Wool • Pipe Covering
Stalastic • Insulseal • Insulstic
Swetchek • Finishing Cements
Insulating Cements

THE EAGLE-PICHER COMPANY

General Offices: Cincinnati (1), Ohio

Insulation products of efficient mineral wool—for a full range of high and low temperatures. Technical data on request.

EAGLE EP PICHER

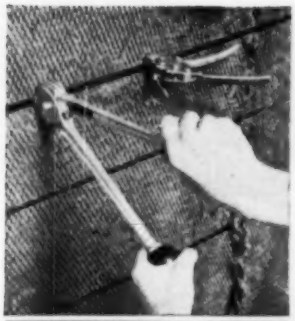
Since 1843

The perfect answer

FOR MAXIMUM FUEL SAVINGS AND EXACT TEMPERATURE CONTROL

For a completely effective, low-cost insulation combination, you can't beat the teamwork of Eagle-Picher Mineral Wool Blankets, Supertemp Blocks, Super "66" Cement and Insulseal. They work effectively to give your equipment higher efficiency . . . cut operating costs . . . and help to provide perfect, precise control over temperatures.

Visit Booths 678 and 679 at the Chemical Show in New York November 28 to December 3



EAGLE-PICHER MINERAL WOOL BLANKETS

These blankets satisfy the need for a convenient method of quickly and efficiently insulating flat or curved surfaces on larger types of heated equipment. Mineral wool is felted and secured between flexible metal fabric. Outstanding physical and chemical stability enable Eagle-Picher Blankets to resist water, steam, corrosive fumes and normal vibration.

EAGLE-PICHER SUPERTEMP BLOCKS

Eagle-Picher Supertemp Blocks are lightweight (approximately 16 lbs. per cu. ft.). Can be cut easily with knife or saw to fit off-shaped areas . . . they fit snugly over minor irregularities. They're strong and have high refractory value. Withstand temperatures up to 1700 F. Conductivity at 512 F. approximately 0.43...all standard sizes, from 3" x 18" to 12" x 36" . . . in thicknesses from 1" to 4".

EAGLE-PICHER SUPER "66" INSULATING CEMENT

Super "66" is all-purpose, rust-inhibitive, extremely adhesive insulating cement. "Springy ball" pellets don't collapse after application . . . give great coverage, retain their thermal efficiency. 100 lbs. covers 65 sq. ft. —1 inch thick! Easily applied with trowel, over flat and irregular surfaces. Efficient for temperatures up to 1800 F. Reclaimable when used on equipment whose temperatures go up to 1200 F.!

EAGLE-PICHER INSULSEAL

A tough, weatherproof, protective coating for insulation. For temperatures up to 450 F. Applied as a plastic, its smooth troweling qualities assure uniform coverage, proper thickness. It protects insulation from air infiltration, fumes, rain, snow, vibration, punctures, and withstands severe service, indoors or out. Dries to a smooth, rich black, has a neat appearance on hot or cold surfaces . . . may be washed or painted.

THE EAGLE-PICHER COMPANY *General Offices: Cincinnati (1), Ohio*

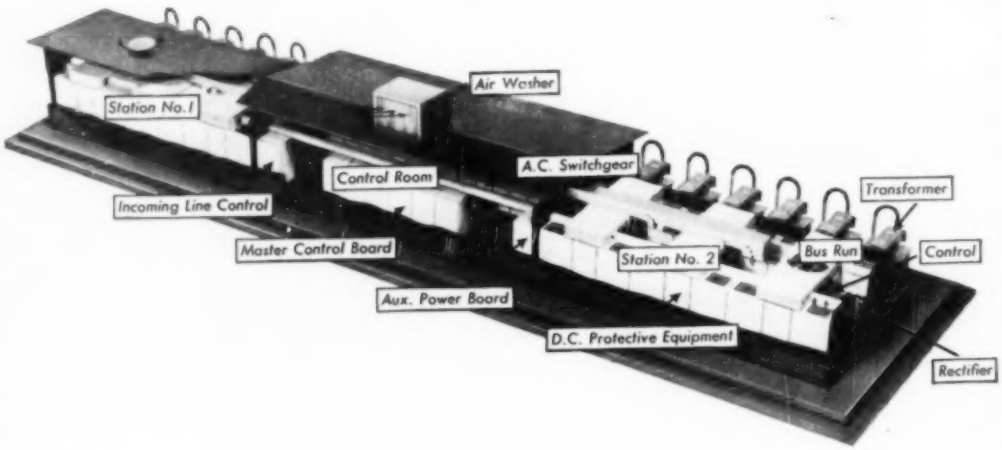
Insulation products of efficient mineral wool—for a full range of high and low temperatures. Technical data on request.

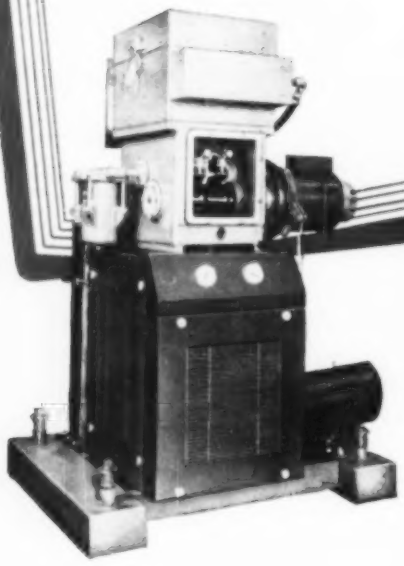
EAGLE EP PICHER

Since 1843

I·T·E opens its order book for a PREVIEW OF TO

featuring the new I-T-E Low Voltage Mechanical Rectifier





HERE'S WHY I-T-E'S MECHANICAL RECTIFIER WAS SELECTED FOR THIS INSTALLATION—

- **It's more efficient.** Operating efficiency is actually 96% in the 200-volt and 325-volt station! It's not necessary to resort to high voltages to obtain high efficiency, if you use the I-T-E Mechanical Rectifier.
- **It saves space.** This typical plant layout shows space savings of up to 50%. Consider what this would mean to you in savings on building costs.
- **Maintenance is simplified.** No complicated tools or instructions are needed for the adjustment and maintenance of the new I-T-E Mechanical Rectifier.
- **Reduced installation cost.** Unit-assembly at the factory makes it possible to deliver the equipment as a complete "package."

31 Offi
SWITCHG

TOMORROW'S RECTIFIER STATION

● Here it is! — the first functionally planned rectifier station . . . a complete installation built around I-T-E's new Mechanical Rectifier!

This equipment is now being built at I-T-E. When completed, the installation will consist of two rectifier stations, each delivering 24,000 amperes — one at 200 volts, and the other at 325 volts.

NOTE THE MANY FEATURES OF THIS MODERN STATION:

The centrally located operating room contains all necessary controls — makes for efficient operating procedures. All equipment for the operation of the entire station is within easy and immediate reach of the operator.

Drawout-type a-c protective switchgear is also in the central location, convenient to the rectifier control board.

I-T-E Mechanical Rectifiers and the controls for individual units are completely enclosed in metal.

The overhead bus carrying the d-c power from the rectifier to the d-c switchgear is completely metal-enclosed.

NOTE THAT IT WAS NOT NECESSARY TO PROVIDE OVERHEAD CRANE SPACE:

I-T-E Mechanical Rectifiers can be moved easily and quickly on their own wheels, as can the I-T-E a-c and d-c drawout breakers. *Complete mobility* of I-T-E units eliminates the need for overhead crane facilities and makes it possible to use the space for bus runs.

The I-T-E equipment for this station will be delivered to the installation site as packaged units — completely assembled, wired, tested, and ready to connect!

Get the complete story . . .

I-T-E Bulletin 4809 contains complete technical information on the I-T-E Mechanical Rectifier, as well as a detailed presentation of its operating principles. Send for it today!

MECHANICAL RECTIFIERS

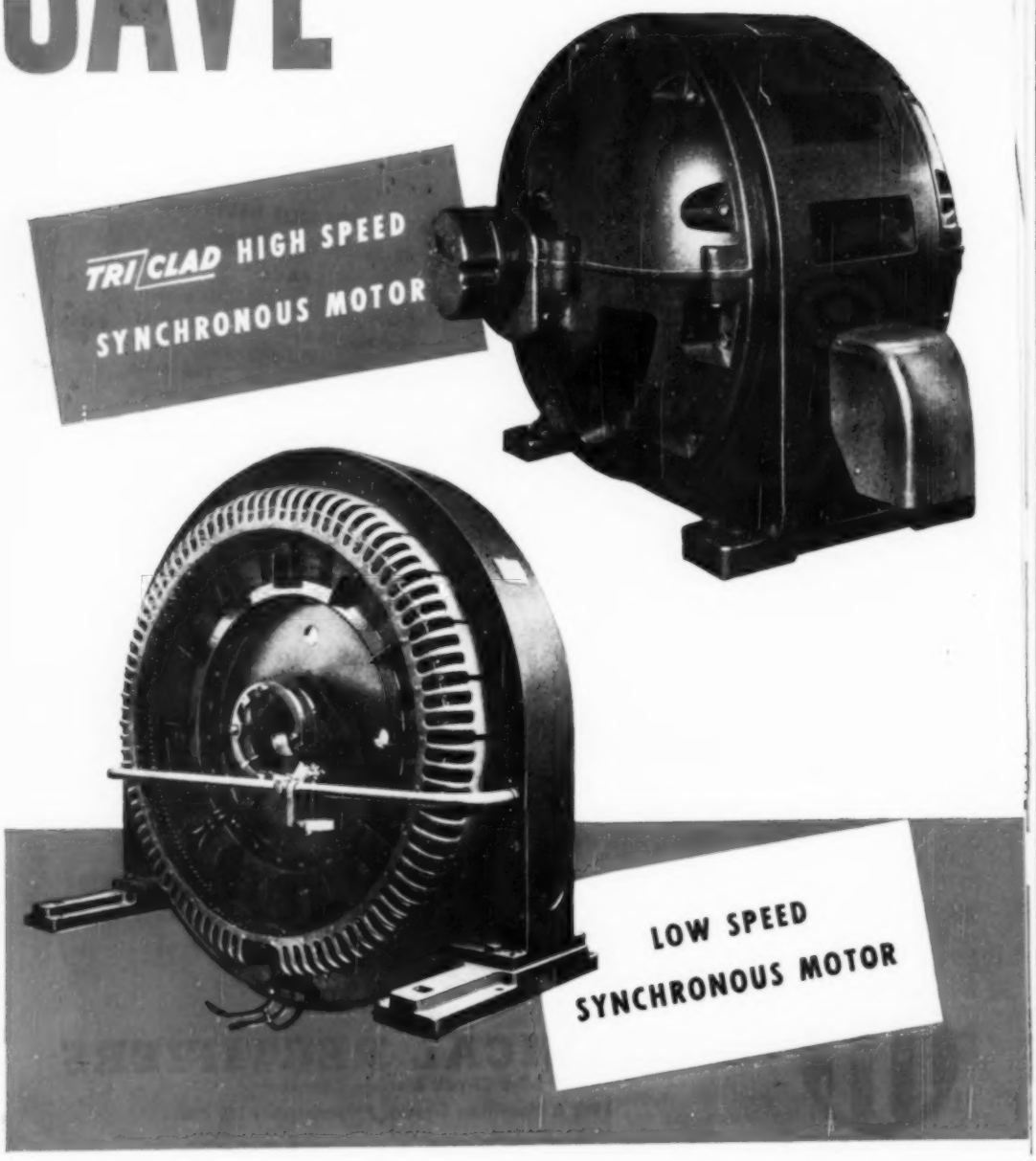
I-T-E Circuit Breaker Company

19th & Hamilton Streets, Philadelphia 30, Pa.

31 Offices in United States • In Canada, EASTERN POWER DEVICES LTD., Toronto • For Export: Phillips Export Corp., New York

SWITCHGEAR • UNIT SUBSTATIONS • ISOLATED PHASE BUS STRUCTURES • CIRCUIT BREAKERS • MECHANICAL RECTIFIERS • RESISTORS • SPECIAL PRODUCTS

SAVE ON POWER BILLS



WITH GENERAL ELECTRIC SYNCHRONOUS MOTORS

SYNCHRONOUS MOTORS IMPROVE POWER FACTOR

1. **Save you penalty charges for poor power factor**

2. **Release needed generating capacity**

Here's an example:

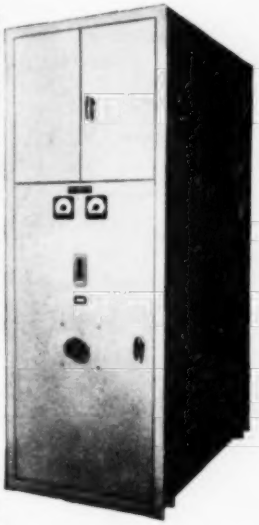
One mill improved power factor from 84 per cent to 72 per cent by installing a 300 hp .8 leading power factor G-E synchronous motor in place of another motor. This corrected power factor released 260 kva capacity in their generating equipment and allowed installation of additional motors.

These savings in cost of operation are available to you.

Savings in the initial cost of equipment are also available—when synchronous motors are used in their natural fields of application. To find out about these natural fields of application, get in touch with our nearest office.

REMEMBER—General Electric Synchronous motors—whenever you need constant speed. They can give you lower initial cost, lower operating cost. For bulletin information, fill in the coupon:

G-E SYNCHRONOUS MOTOR CONTROL MAKES SURE



G-E synchronous control provides the accurate adjustments that enable you to improve power factor. Here's where details count—where the slightest variation of a pointer on a meter means money saved—or lost. And General Electric has not overlooked these elements. Consider the meters for a moment. Here, G-E has devised a long scale with the pointer in the same plane as the figures so there can be no possibility of misreading the instrument. Anti-glare gluss is used so no distortion is possible.

The new smaller rheostat, too, has design features that not only result in longer life but in greater operating convenience and accuracy. The handle has been molded to fit the fingers of the operator—to prevent slippage and over correction. You can be sure, too, that the new field circuit will respond instantly to rheostat adjustment.

Protection is assured the operator through the attractive steel enclosure. The cabinet resists blows, keeps out dirt and other operating hazards. All live parts are strongly guarded. Plant appearance is improved with this control designed to line up with other G-E power units such as switchgear. Ask your nearest G-E office for more information about this equipment that safeguards your investment . . . helps save operating expenses.

Apparatus Dept., Sec. B770-6, General Electric Company
1 River Road, Schenectady, New York

Gentlemen:
Please send me: ☐ GEC-205, Synchronous Motor Control ☐ GEA-5113, High-speed Synchronous Motors
☐ GEA-529D, Low-speed Synchronous Motors

Name ..... Company .....
Street ..... City .....
State .....

GENERAL ELECTRIC

no more hand-me-downs

for stainless sheet and strip

Stainless sheet and strip production is coming of age—no longer made on the hand-me-downs of carbon steel production, thanks to modern advances in strip mill practice. CRUCIBLE, drawing on this progress and on generations of *specialty* experience, has carried stainless development even further by building the world's first complete mill designed *specifically* for hot and cold rolling of stainless steels. In this $18,000,000 project, every building, every piece of equipment, has been built to incorporate the *best* of accepted modern practice, PLUS exclusive features designed by CRUCIBLE's industry-famous technical staff.

Here stainless sheet and strip is produced in widths from ½" to 50" inclusive, in all gauges, grades and finishes. This new and important contribution to the production of stainless steel is vital news to every processor of stainless steel products. For now CRUCIBLE, one of the pioneers in stainless steels, rounds out an integrated program of stainless in all its forms—sheets, strip, plates, bars, wire, forgings, castings and tubing (manufactured by the new subsidiary, Trent Tube Co.). To this program CRUCIBLE has applied its *specialty product* methods of quality control, methods that have given CRUCIBLE leadership in special purpose steels for half a century. Data sheets for all grades are yours for the asking. Your inquiries will be welcomed.

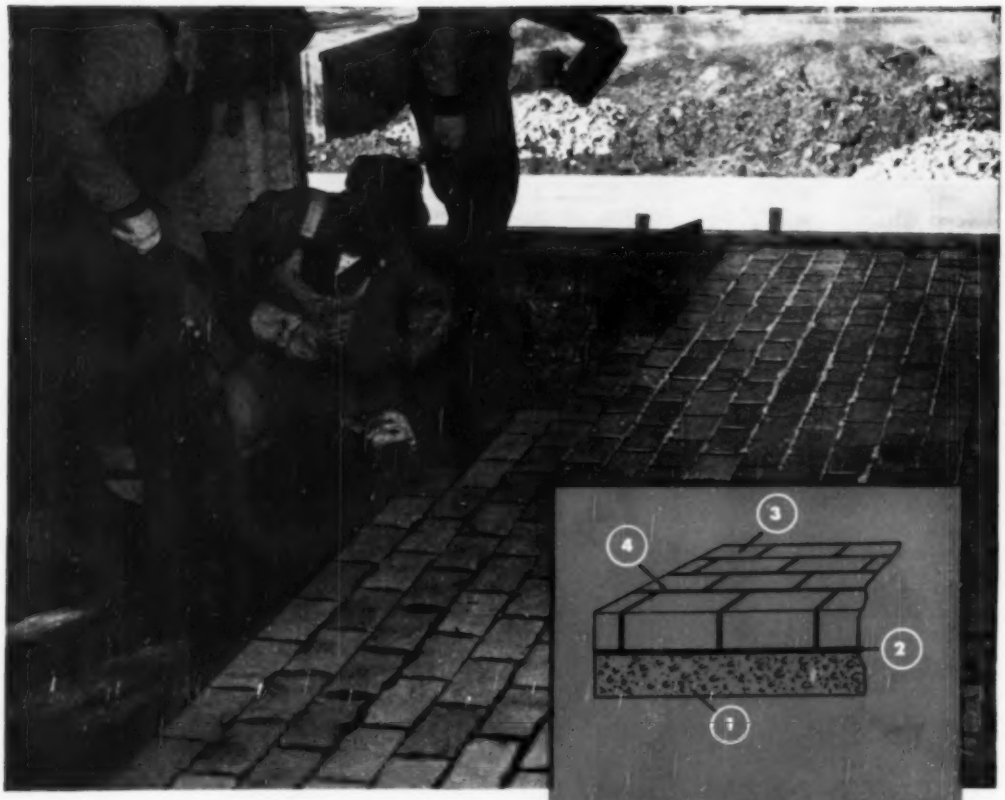
new tools for a **MASTER** mechanic

CRUCIBLE STEEL COMPANY OF AMERICA
405 Lexington Ave,. New York 17, N. Y.
Branches, Warehouses and Distributors in Principal Cities

CRUCIBLE first name in special purpose steels

hot and cold rolled **STAINLESS SHEET AND STRIP**

STAINLESS • HIGH SPEED • TOOL • ALLOY • MACHINERY • SPECIAL PURPOSE • STEELS



1. Concrete or steel sub-base.
2. "Resilon" membrane forms an impervious barrier between brick and sub-base.
3. Dense, non-porous "Ussco" Acid Brick.
4. Bonded with "Durisite" quick setting acid-and-alkali-resistant cement.

THIS FLOOR WILL HANDLE *Both* ACIDS AND ALKALIES

A "U. S. Specification Floor" such as shown above and sketched at the right will handle *both* acids and alkalies, or acids and alkalies alternately. Strong and weak acids, strong and weak alkalies, oils, solvents, cold water, or live steam leave it unruffled. It will stand up under heavy traffic year after year with negligible maintenance costs.

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THE Chementator

Reg. U. S. Pat. Off.

COMMENTS ON THE NEWS OF CHEMICAL ENGINEERING IN INDUSTRY

September 1949, Volume 56, Number 9

How much coal for liquid fuels?

COAL NEEDS—Once the government's program for converting coal into liquid fuels hits its stride, the added demand for coal will range from 190 million to 210 million tons a year. Up to 65 percent of the raw coal needed to make 1 million barrels of oil a day will come from untapped coal lands lying west of the Mississippi. The rest will come from the East.

ESTIMATES—Assume a total need of 575,000 tons a day. This would mean about 200,000 tons from the East and 375,000 tons from the West. With increased efficiency and more operating days a year, eastern producers probably could mine the required tonnage without adding much to manpower and without opening new mines. In the West, however, more miners would be needed and new mines would have to be opened. Over-all manpower needs for a full-scale coal-to-oil industry are estimated at 160,000 workers, 50,000 of whom would be coal miners.

LOCATION—The location of coal-to-oil plants will depend primarily upon the availability of coal. A 20-yr. plant life, about the shortest that can be considered, would call for a daily mining capacity of 6,000 tons of bituminous, 7,300 tons of sub-bituminous or 9,200 tons of lignite to make 10,000 bbl. a day.

Other location factors will include a good water supply, nearby markets, good transportation, adequate labor supply and the existence of such ready-built facilities as mines, housing, chemical plants, pipelines and coke plants.

Dollars into phosphates

DEBENTURES ISSUED—To get capital to finance the expansion of its elemental phosphorus and phosphates business, Food Machinery & Chemical Corp. has marketed an issue of $8 million of 2¾ percent sinking fund debentures due August 15, 1969. The issue had a ready sale. Aggregate estimated cost of the phosphorus and phosphates project is $11.4 million, of which about $5.13 million had been shelled out by mid-1949.

PHOSPHORUS FURNACES—Part of the net proceeds from the sale of the debentures will go to defray the $7.35 million cost of two electric furnaces at Pocatello, Idaho. One of these furnaces, now up and ready to operate, has a phosphorus manufacturing capacity of 8,000 tons a year. The other, to be completed early in 1950, will turn out 9,000 tons of elemental phosphorus a year.

Food Machinery gets the phosphate shale to supply these furnaces from the nearby Fort Hall Indian Reservation under a long-term supply contract with the J. R. Simplot Co. It is estimated that there is enough phosphate shale on the 2,400 acres held under leases by Simplot to keep the two furnaces running at rated capacity for at least 25 yr. and probably longer.

PHOSPHATE MANUFACTURING—In addition, Food Machinery will use money from the loan to pay for construction of phosphate manufacturing facilities at Newark, Calif., and for the enlargement of phosphate capacity at Carteret, N. J. Estimated cost of these facilities is $4.05 million.

SODA ASH—Food Machinery is also in the soda ash business. At Westvaco, Wyo., it mines trona from a 1,500-ft. deep shaft, 12 ft. wide and concrete-lined. In a small calcining plant near the shaft the trona is converted into natural soda ash. This entire project is still in the development stage. But there is plenty of trona for any future expansion. Large beds of it, part of the Green River formation, lie in strata varying from 1,100 to 1,800 ft. in depth.

Trona is mined on a royalty basis under terms of a license from the Union Pacific Railroad. The license runs for 50 yr. with an option to extend it for 10 yr. or more. The Union Pacific has also granted rights to prospect for trona over an extensive area.

Another cellophane producer

DEAL—Soon to go into production of cellophane is W. R. Grace & Co. of New York (see *Chementator*, Feb. 1949, p. 78). After more than six months, negotiations between W. R. Grace and Du Pont are about completed and the final deal is ready to be struck. A site for the Grace cellophane plant has been selected.

SUM—More than $20 million is involved. That was the minimum capital requirement stipulated by Du Pont when, stung by Department of Justice monopoly charges, it offered free patents, technical

(*Continued on* page 70)

That's right! POWELL VALVES

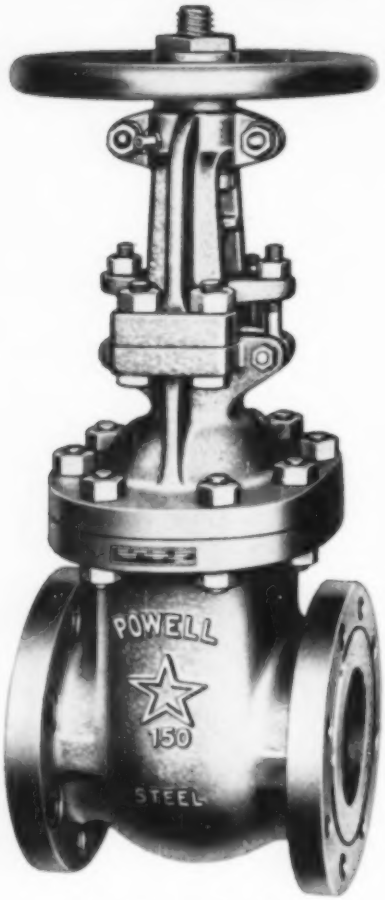

Fig. 1503—Class 150-pound Cast Steel Gate Valve with flanged ends, outside screw rising stem, bolted flanged yoke, tapered solid wedge.

Flush Bottom Tank Valve. Available in two designs: **Fig. 2309**—disc rises into tank to open; **Fig. 2310**—disc lowers into body.

Bellows Sealed "Y" Valve. Powell's Bellows Sealed Valves—Globe and "Y" patterns—are designed for high vacuum service and for installations where packing is unsatisfactory or fails frequently. The bellows is enclosed within the valve body, completely sealing the interior of the valve from the outside atmosphere. Available in 18-8S, 18-8S Mo., Monel Metal, Hastelloy, in sizes ¼" to 12", inclusive.

POWELL

really cut maintenance costs

Every day, *the cost of production* is becoming a more important factor . . . and *maintenance* is a major item.

Take, for example, the cost of maintaining flow control equipment. By installing Valves that are properly designed and made of materials best suited to meet the exacting requirements of the service in which they are to be used, you not only save in the amount of wages paid out to maintenance crews, but you avoid costly shut-downs with consequent loss in production.

To build valves that give longer, trouble-free service has always been and is a prime consideration of Powell Research and Engineering. That's why it pays to standardize on *Powell Dependable Valves*. Ask your nearest Powell Valve Distributor—or write direct.

Fig. 2051—Stainless Steel "Y" Valve with flanged ends, bolted flanged yoke-bonnet and outside screw rising stem.

Fig. 1845—200-pound Nickel Swing Check Valve with screwed-in cap and regrindable, renewable disc.

Fig. 1969—150-pound Monel Metal Gate Valve. Flanged ends, outside screw-rising stem, 4-bolted flanged yoke-bonnet, tapered solid wedge. Globe Valves are also available in this design. →

Powell Valves are made in Bronze, Iron, Steel and a wide selection of Corrosion-Resistant metals and alloys. Valves of every type—Globe, Angle, Gate, Check, Non-return and Flush Bottom Tank Valves—are included in the Complete Powell Line.

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DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES

VALVES

assistance and a plant site at cost to any prospective competitor.

OUTPUT—Currently, over-all output of cellophane is about 220 million pounds a year, with Du Pont making 75 percent and American Viscose the rest. After its expansion at Fredericksburg, Va., however, Viscose hopes to produce 40 percent of the total. Just how much capacity the entry of W. R. Grace into cellophane production will add to the total and what percentage of the market will go to Grace remain to be seen.

More synthetic fibers

Synthetic fibers keep climbing. U.S. consumption figures for 1948, compiled by the Department of Agriculture, show that rayon reached an all-time high of 1,017 million pounds, or 14.9 percent of total fibers consumed.

Synthetic fibers other than rayon climbed to 1 percent of total fiber consumption, an increase over 1947, too. They rose from 48.9 million pounds in 1947 to 70.7 million pounds in 1948.

Celanese to license patents

Celanese has placed upon the U. S. Patent Office Register of Patents Available for Licensing about 2,400 patents. These patents cover processes for the manufacture of textiles, plastics and chemicals. Now applicants can take out licenses on substantially all patents owned by Celanese.

British and Canadian patent rights corresponding to the U. S. patents are also held by Celanese. Subject to British and Canadian laws, sub-licenses on these patents can also be secured by applicants.

Panel settles atomic dispute

DISPUTE—In one of its first cases, the new Atomic Energy Labor Relations Panel has helped to settle a dispute between Monsanto and the CIO Gas, Coke & Chemical Workers over an original contract. It covers some 250 employees at the new Mound Laboratory at Miamisburg, Ohio, operated for AEC by Monsanto.

MEETING—The company and union met for two days with the AEC panel, headed by William H. Davis, former chairman of the Natonal War Labor Board. The union had rejected a general wage increase of more than 10c. an hr. offered by Monsanto. Under the new government procedure in AEC labor disputes, both sides had agreed to continue operations until the panel had a crack at settling their differences.

NO GENERAL INCREASE—The union did not get a general wage increase. Instead, varying increases, ranging up to 52c. an hr. and averaging about 20c., were given to correct inequities between different job rates. The adjustments were based on a job evaluation study.

Employees will get a premium of 5c. an hr. for second shift work and 10c. on the third shift.

NO UNION SHOP—The union lost its demand for a union shop, but got an irrevocable checkoff covering union members. In addition, Monsanto agreed to supply the union with the names of all new employees.

OTHER PROVISIONS—In accordance with AEC policy, the contract provides for arbitration of all grievance disputes over application of the agreement.

Employees will be entitled to leaves of absence. They will also get three days of leave with pay when there is a death in the family. Absence taken for union work will be credited toward the worker's seniority.

Employees will be paid for time spent on the grievance committee and in bargaining meetings. Safety and educational committee meetings will be on company time.

Earnings of chemical workers high

HOURLY RATES—Chemical plant employees are well paid. A Bureau of Labor Statistics survey of almost 800 plants shows: (1) average straight-time rates are $1.51 an hr. or better; (2) less than 5 percent of the workers make less than $1.00 an hr.; and (3) 15 percent earn $1.80 an hr. or more.

MINIMUMS—About 3 percent of the plants report minimum rates below 60c. an hr. But more than one-third have minimums between $1.00 and $1.25, while one-fourth have minimums of $1.25 or more.

REGIONS—Highest wage rates are reported in the Southwest, where the average rate is $1.62; lowest is the Southeast with $1.20.

INDUSTRIES—Here is how the average hourly rates break down for different industries: cleaning and polishing preparations, $1.14; insecticides and fungicides, $1.15; sulphonated oils, $1.22; miscellaneous chemicals and chemical products, $1.26; compressed and liquefied gases, $1.38; plastic materials and elastomers, $1.48; intermediates and dyes, $1.50; bone black, carbon black and lamp black, $1.60; and organic chemicals, $1.67.

France to boost potash output

France's potash production is due for a 500,000-ton-a-year increase. An ECA-approved project to modernize Mines Demaniales de Potasses d'Alsace calls for expenditure of $4 million in ECA funds, $1 million in foreign exchange and $120 million in French francs.

(*Continued on page 72*)

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These mines are the principal European sources of potash outside Russia and the Russian zone of Germany.

Modernization of the mines underground will include introduction of mechanical loaders, shuttle cars, coal cutters and drilling machines. Present outmoded equipment for the thermal treatment of potash will be replaced by up-to-date levigation and flotation equipment.

Imports hurt Gulf Coast refiners

Independent oil refineries on the Gulf Coast have been hard hit by the importation of large volumes of foreign oil and petroleum products. Many of them have either curtailed operations or shut down completely. These refineries normally process over 120,000 bbl. of oil a day.

These plants do not include Crown Central Petroleum Corp.'s Houston refinery. This refinery is shut down due to labor difficulties. It has a capacity of about 25,000 bbl. of oil a day.

Sulphuric acid plants for Pakistan

Pakistan will be self-sufficient in sulphuric acid by 1950. By then, three additional plants now under construction are to be completed.

Chemical Construction Corp. is supplying a 20-ton and a 10-ton contact process plant, while Power-Gas Corp., Ltd., a British outfit, is supplying a 10-ton contact plant.

The three new plants will raise Pakistan's total to six, and the 40 tons of new capacity will boost her rated production of sulphuric acid to 82 tons a day.

ECA money for Italy's pulp and paper makers

FINANCING—Italian newsprint production will get an ECA-financed shot in the arm that will boost output by some 25 percent. ECA has given the green light to a project to re-equip and modernize two of Cartiere Burgo's 11 Italian pulp and paper mills. The two plants at Corsico and Verzuolo, in Northern Italy, are scheduled to get almost $1.7 million worth of U. S. machinery and equipment. Cartiere Burgo itself plans to put 1 billion lire into the project.

MILL PRODUCTION—Expansion is not only supposed to cut costs by some 10 to 15 percent but to increase daily production to about 300 metric tons, against a current rate of 210 tons for the two plants.

Bulk of this increase is to be exported to South America, the Near and Far East.

ECA claims the increased production will not intensify Europe's shortage of softwoods. Reason: the plants use 80 percent poplar groundwood, only 20 percent spruce and other softwoods.

EQUIPMENT PURCHASES—Equipment to be bought with the $1,650,000 ECA allocation includes parts and drivers to modernize continuous paper machines, parts and accessories for construction of a new continuous paper machine, and special equipment, such as fork lift trucks, control and laboratory instruments, and equipment for groundwood production.

Texas to get Tennessee Eastman plant?

Tennessee Eastman has been seesawing between Arkansas and Texas as possible locations for a plant. It now looks as though Tennessee Eastman would settle on Longview, Tex., as the site. To cost an estimated $5 million to $10 million, the unit will turn out chemical raw materials for the company's Kingsport, Tenn., organics plant.

Texas ammonia plant for Dow

NEW UNIT—Dow Chemical will build an ammonia plant at Freeport, Tex. To cost $5 million, it will have a capacity of 100 tons a day.

CONSTRUCTION—Field construction is expected to start the first of the year. The plant is to be completed late in 1950.

RAW MATERIALS—Hydrogen from Dow's chlorine will be combined with nitrogen from the atmosphere to form anhydrous ammonia.

MARKET FACTORS—Broadening industrial uses for ammonia, plus promising agricultural markets on the Gulf Coast, led to Dow's decision to build the plant at this time.

More ammonium sulphate

Finney Chemical Co. is putting up an ammonium sulphate plant at Houston, Tex. Until now, this Houston company has been a producer of flake caustic.

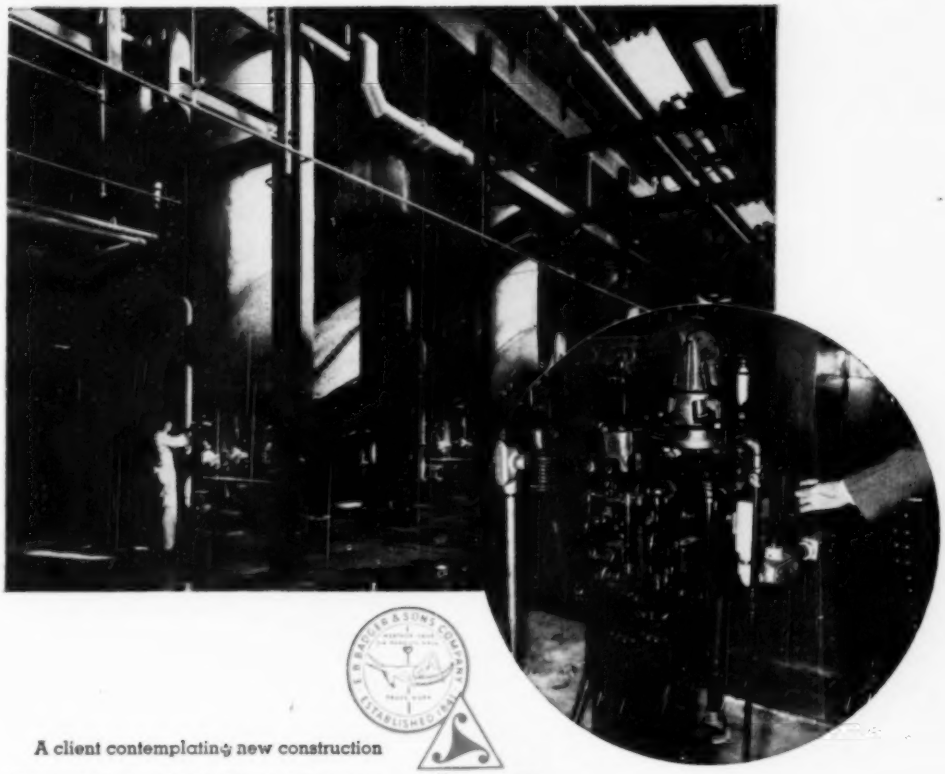
Diamond adds silicate capacity

To double production of sodium silicate at its Cincinnati, Ohio, plant, Diamond Alkali is undertaking a $300,000 expansion program. A new 50,000-ton furnace will be installed at the plant, which already has two furnaces. The furnace building will be remodeled to accommodate the new furnace. By the end of 1949 the entire project is expected to be completed.

Behind the expansion move was the constant demand of the oil refining industry for more silica gel catalyst. Diamond's sodium silicate is used by manufacturers of the silica gel catalyst.

Other ripe markets for sodium silicate further

(*Continued on page 74*)



A client contemplating new construction frequently knows the fundamental process scheme. The client's knowledge of his basic process is then complemented by Badger's broad experience in the design and efficient construction of plants using similar types of processes in allied industries. This teamwork has produced plants giving maximum dependability of operation with minimum operating costs. It may represent the approach to your next project.

COMPLEMENTARY TEAMWORK . . .

In many cases the client's knowledge of the details of a specific problem, plus Badger's ability to engineer and construct facilities to produce the desired results, form an ideal team.

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PROCESS ENGINEERS and CONSTRUCTORS for the CHEMICAL, PETROLEUM and PETRO-CHEMICAL INDUSTRIES

influenced Diamond's decision. Among these are the use of silicate in making laundry soaps and washing compounds, its use as an adhesive in making fiber boxes, and in certain textile processing and paper manufacturing operations.

Hydrogen plant for Lever at Hammond

Construction of a Hygirtol plant for Lever Bros. at Hammond, Ind., has been started by the Girdler Corp. Lever engineers are working with Girdler on the project.

Using the hydrocarbon-steam process, the Hygirtol plant, a Girdler-designed unit, will produce high-purity low-cost hydrogen. When completed it will add to Lever's present hydrogen-producing capacity at Hammond.

Paper mill on Colorado River

A new firm, Columbine Development Co., Grand Junction, Colo., plans a $15 million paper mill on Colorado's western slope. It would turn out 185 tons of newsprint daily and 65 tons of sulphate pulp for finer papers. The site, not definitely picked, will be on the Colorado River between Rifle and Newcastle.

Ammonia, gypsum and potash units

A $16 million ammonia plant near Pasco, Wash., is planned by Westate Agricultural Chemical Co., which has just filed incorporation papers. In addition, the firm plans a $100,000 quarry and a gypsum processing plant to cost about $700,000 in the vicinity of White Sulphur Springs, Mont., plus a $600,000 potash processing plant near Marysvale, Utah.

Shorter week and pension sought

With layoffs rising, unions will press for a shorter work week to spread the work. The CIO Oil Workers want a 36-hr. week with no loss in pay. This year's demands also include a $100 monthly pension at age 65.

From paper workers, a plug for management

ADMISSIONS GRUDGED—It is not often that a union trumpets about any concessions it wins from management. The usual technique is to complain that management has not conceded enough.

NEW DEPARTURE—That is why it is news when the CIO Paper Workers boast that their new contract with Consolidated Paper Co. of Monroe, Mich., gives them "the highest average wages in the industry."

HIGHEST PAID—The 1,700 workers affected got a 5c. increase in hourly and incentive base rates, bringing their average hourly earnings to $1.90, including overtime. Other gains: hospital benefits increased from $6 to $8 a day; incidental hospitalization allowance raised from $60 to $80; and sickness and accident benefits boosted from $12 to $21 a week.

At Natrium, a newcomer in organics

Production of the chlorinated benzenes in the new plant it has just started up at Natrium, W. Va., puts the Columbia Chemical Division of Pittsburgh Plate Glass smack into the business of manufacturing organics. Under construction for more than a year, the new unit at Natrium is estimated to have cost more than $1 million. It will turn out monochlorobenzene, ortho- and para-dichlorobenzene and muriatic acid.

Situated on the Ohio River about 30 mi. south of Wheeling, W. Va., the Columbia plant is strategically located close to its raw material sources and to the markets for its products. Benzene comes to the plant by river shipment from the coke ovens of Wheeling and Pittsburgh steel mills. Columbia makes its own chlorine at Natrium in an electrolytic unit next door to the benzene chlorinating plant. The electrolytic unit was built in July 1943 to lick a critical wartime shortage of chlorine and caustic.

One of the biggest ever built as a single unit, the Natrium chlorine plant had its capacity jacked up 25 percent last year. Salt brine for the electrolytic chlorine-caustic plant is pumped up from mile-deep wells—the deepest salt wells in the country.

Nitromethane powers rockets

Most rocket fuels require liquid oxygen for combustion. But this form of oxygen is difficult to handle—and dangerous. It must be kept under pressure. Otherwise it will boil at the sub-zero temperatures encountered sky-high.

Rocket engineers have been seeking a liquid monopropellant—a fuel that would vaporize into hot, fast-moving gases without requiring risky oxygen.

That fuel has been found. It is nitromethane, one of the nitroparaffins made by Commercial Solvents at Peoria. Used largely as a solvent in industry, nitromethane is now being tested in rocket engines with promising results.

Quite safe at ordinary temperatures, nitromethane explodes at about 500 deg. F. into a hot mixture of nitrogen, hydrogen, carbon monoxide, carbon dioxide and steam. By employing a catalyst, a smooth continuous explosion yielding a rocket thrust comparable to the best is achieved.

Experts predict that nitromethane, because of its ease of handling and comparative safety, will have a bright future in the development of rockets.

—*End*

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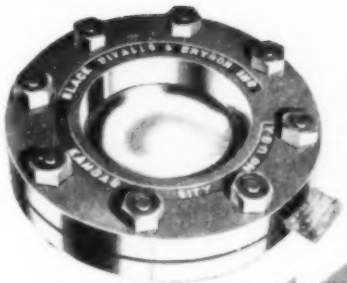

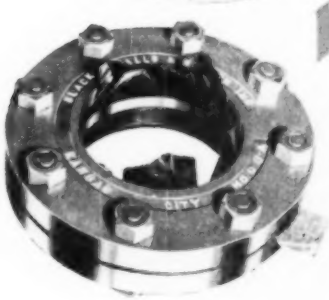

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*Century 100 horsepower squirrel cage motor driving a refrigeration compressor.

*Century 125 horsepower motor in a large factory driving a pump.

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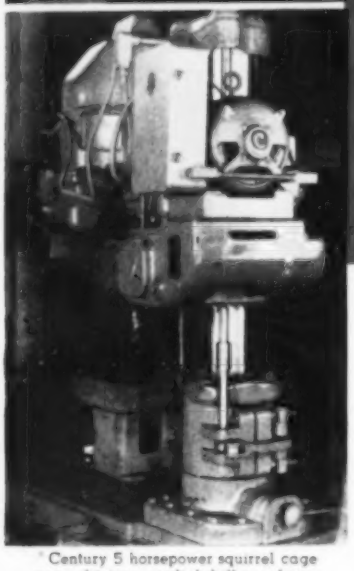

*Century 5 horsepower squirrel cage motor driving a radial drill in a large metal working department.

There is a ***correct*** Century motor available to furnish economical power for all popular industrial and commercial applications.

Century polyphase motors are available in addition to the type SC for all normal torque applications—type SCH for high starting torque; type SCT for high torque with high slip; type SR for high starting torque with low starting current and adjustable varying speeds; and Selective Speed Drives for flexible control of automatic operations.

For protection against atmospheric hazards Century offers:

Drip Proof General Purpose Motors — protection against falling solids and dripping liquids.

Splash Proof Motors — protection against splashing liquids, rain, snow, sleet and ice.

Totally Enclosed Fan Cooled Motors — protection against dusts, mist and fog.

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Century motors are built in sizes from 1/6 to 400 horsepower for operation on single phase, polyphase and direct current.

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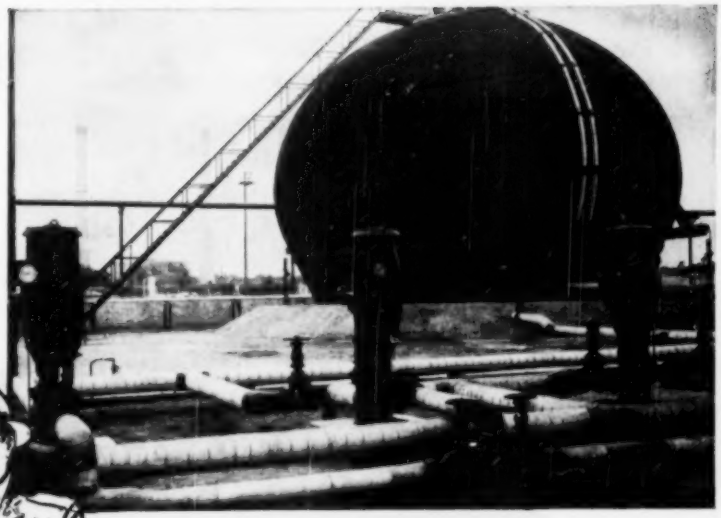


Taking suction from a vessel set at ground level. Three of a large group of VMT Pumps used for feeding, charging, extracting, returning, and transferring acetone, butane, and butadiene.

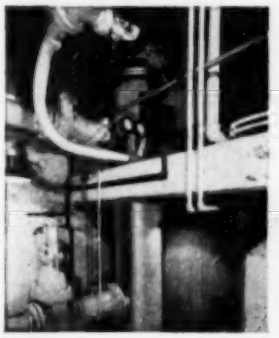
B.J. are you getting your share of specialized engineering?

with pumps for ... low NPSH requirements? ... limited space locations? ... hot and cold fluids? ... corrosive fluids?

As early as 1912, oil company engineers recognized the part Byron Jackson had played in the development of centrifugal pumps. If not the first, Byron Jackson Co., was one of the earliest manufacturers to build a line of centrifugal pumps in anything approaching a good range of types and sizes.

ONE OF MANY OUTSTANDING DEVELOPMENTS, Byron Jackson VMT type are vertical pumps specially designed for limited space locations and pumping jobs where the net positive suction head is limited. These pumps save you the cost of raising vessels or excavating elaborate pits. VMT Pumps take suction from the barrel in which the pumping unit is located. The small pump-base of a VMT is at ground level. The length of the barrel is determined by the NPSH requirement.

Standardized in four barrel sizes . . . 8, 10, 12, and 14 inches . . . the VMT Pumps are available in capacities to 1000 gpm at heads up to 250 psi, and at fluid temperatures to 250°. On special orders capacities to 5000 gpm are available. All sizes, with special materials, are available for corrosive fluids, and for temperatures from sub-zero to 750° F.



For condensate service. This is a 24", 4-stage VMT Pump with a 75 hp, 900 rpm motor. This installation pumps 2000 gpm against a total head of 120'.

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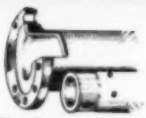
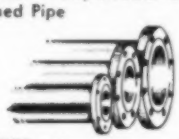
lead-lined
IRON PIPE COMPANY



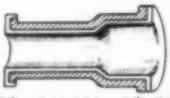
FIRST – Expanded Lead Lined Pipe



FIRST – Homogeneous Lead Lined Pipe

FIRST – Lead Lined Flanged Fittings

FIRST – Lead Lined Valves

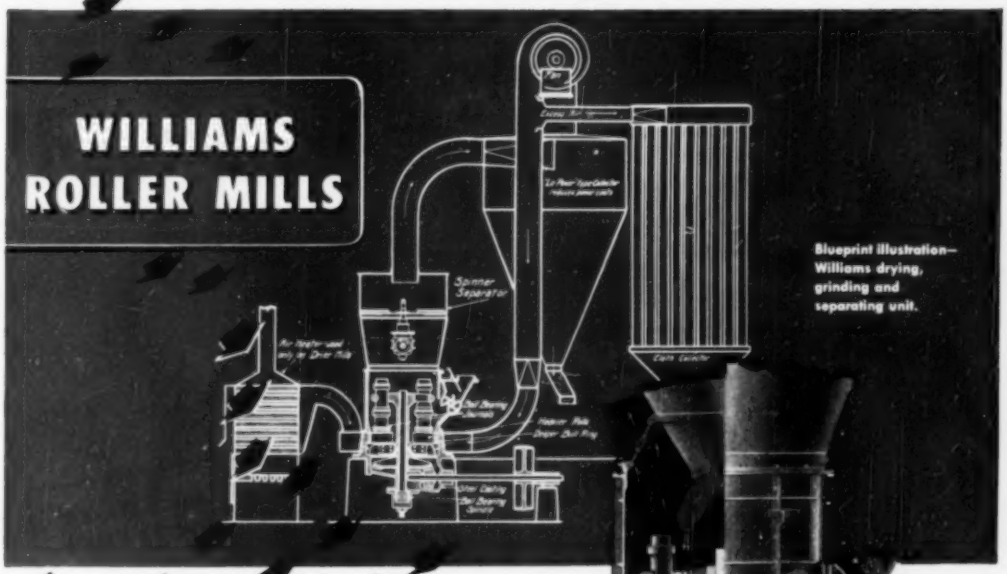


FIRST – Lead Lined Soil Pipe and Fittings

FIRST – Homogeneous Lead Covered Equipment

For those Fine Grinding Jobs . . .

WILLIAMS ROLLER MILLS



Blueprint illustration—Williams drying, grinding and separating unit.

let's look at the record

PYRETHRUM AND OTHER FIBROUS INSECTICIDES

The Williams Roller Mill has given excellent results in the grinding of various rotenone bearing insecticides as it pulverizes the fibres to the same uniform fineness as the rest of the plant. Pyrethrum flowers can be pulverized to 98.5% passing 200 mesh. Also grinds D.D.T., Sodium Fluoride, etc.

PAINTS, PIGMENTS, DRY COLORS

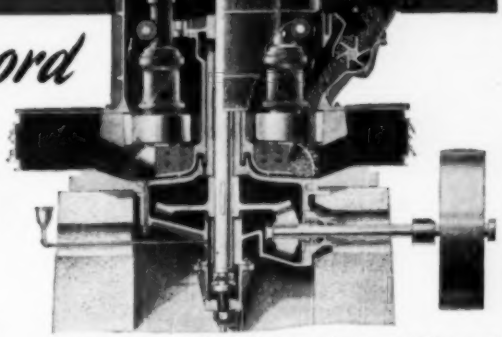
Williams Roller Mills are establishing remarkable records in the grinding of pigments and dry colors to finenesses of 99.95% 325 mesh and finer. Fineness instantly changed by varying speed of Spinner Separator Blades.

FINE GRANULATIONS

Williams has developed a special type of impact pulverizer to operate in connection with the air separator for the making of fine granulations of 30 to 80 mesh with a minimum of fines.

BARYTES, PHOSPHATE, LIMESTONE

Almost any mineral can be economically pulverized with the Williams Roller Mill. Finenesses quickly changeable from 40 mesh to 400 mesh. All can be dried and ground simultaneously by introduction of hot air.



Sectional view of Roller Mill showing how material is ground between rolls and bull ring, then air swept to Separator which extracts fines and returns oversize for re-grinding.

WILLIAMS ALSO MAKES . . .

Heavy-duty hammermills; impact and roller mills for 200 to 325 mesh grinding; drier mills; air separators; vibrating screens; steel bins; complete "packaged" crushing and grinding plants.

WILLIAMS PATENT CRUSHER & PULVERIZER CO.
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WILLIAMS

CRUSHERS GRINDERS SHREDDERS

"You'll make better alkyds my way," says Mr. fatty acid!

Here's a little lesson in logic, says Mr. Fatty Acid. If B is better than A . . . and C is like B but costs less . . . what's your best buy?

Now let's translate that logic to alkyd-manufacture. Soya oils, as you know, are particularly desirable for the manufacture of alkyds. They offer a combination of characteristics possessed by no other oil . . . better color, flexibility, durability, air drying and baking properties. And soya fatty acids are even better than soya oils . . . lighter in color, faster in the kettle because of direct esterification . . . easier to work.

That brings us to ADM's specially developed distilled Soya Fatty Acids. We offer four types: Water White, Regular, RO-10 and RO-4. The latter two are surprisingly economical. Yet they're of unusually high quality.

If you like the reasoning, it points directly to the coupon below. Why not mail it now . . . and be on the way to *finer alkyds at lower cost!*

MAIL THE COUPON TODAY

ARCHER-DANIELS-MIDLAND CO.
600 ROANOKE BUILDING
Minneapolis 2, Minnesota

Please send material checked on ADM FATTY ACIDS:

- ☐ Data for making Alkyds — Bulletin No. 78 on RO-10 Soybean Fatty Acids
- ☐ Chart No. 77 showing Composition and Constants of Fatty Acids

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Company _____
Address _____
City _____ Zone _____ State _____

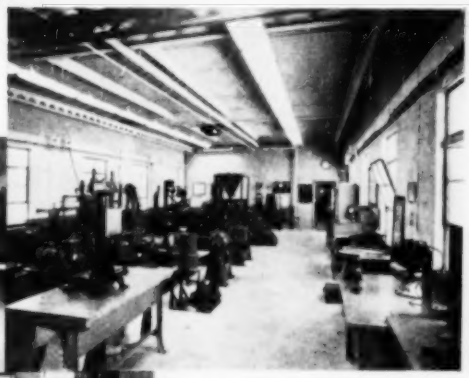
Take the SCIENTIFIC SHORTCUT with

ADM ACIDS

ARCHER-DANIELS-MIDLAND COMPANY
MINNEAPOLIS, MINNESOTA

In the Baker Perkins laboratory, *men who know processing* run many tests each week on plastic masses, paints, gums, slurries and other materials which require mixing or centrifuging. Even though every problem they tackle is different—they are experienced and *have facilities to determine the best method* of processing almost any given chemical material.

By getting right to the core of the mixing problem that each specific material requires, these B-P laboratory men are able to *determine precisely the best speed, temperature, pressure and other conditions* at which a material should be processed. The size and type of equipment that will process it most efficiently is then recommended.

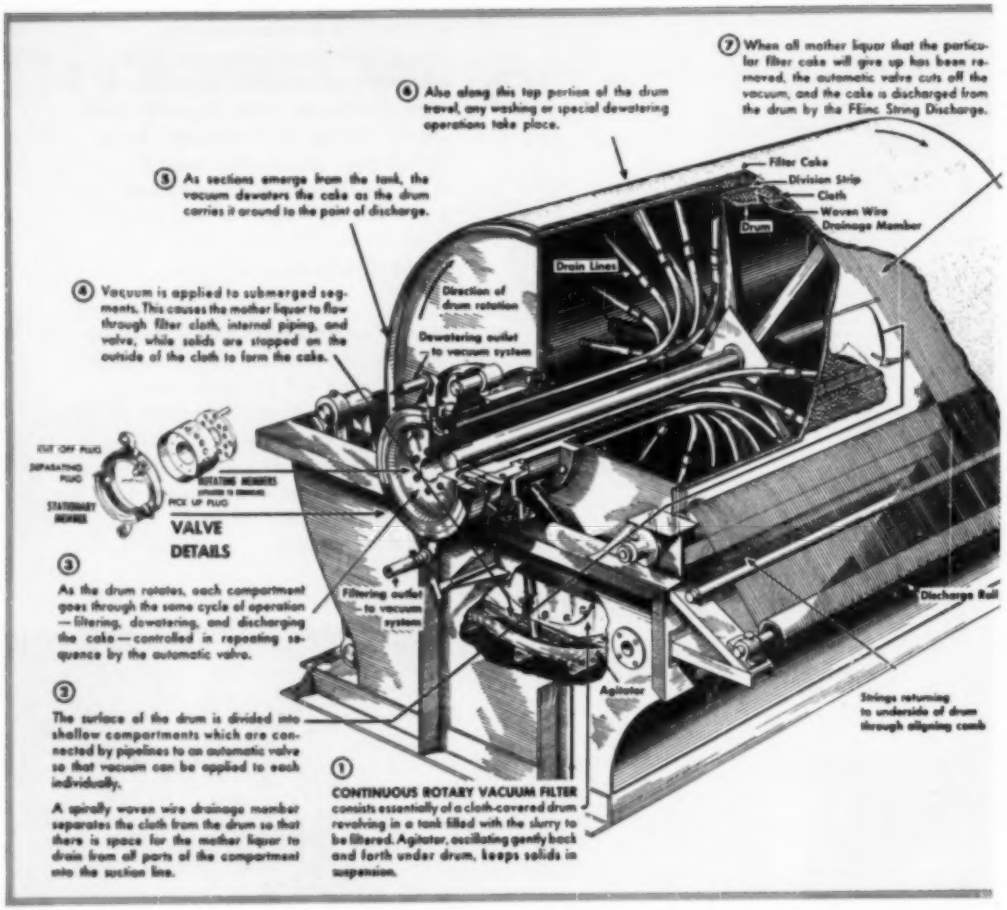


The B-P laboratory is at your service to help you reduce processing costs and improve the quality of your products. Write for information.

BAKER PERKINS INC.

CHEMICAL MACHINERY DIVISION

SAGINAW, MICHIGAN


⑦ When all mother liquor that the particular filter cake will give up has been removed, the automatic valve cuts off the vacuum, and the cake is discharged from the drum by the FEinc String Discharge.
⑥ Also along this top portion of the drum travel, any washing or special dewatering operations take place.
③ As sections emerge from the tank, the vacuum dewaters the cake as the drum carries it around to the point of discharge.
④ Vacuum is applied to submerged segments. This causes the mother liquor to flow through filter cloth, internal piping, and valve, while solids are stopped on the outside of the cloth to form the cake.
Filter Cake
Division Strip
Cloth
Woven Wire Drainage Member
Drum
Drain Lines
Direction of drum rotation
Dewatering outlet to vacuum system
CUT OFF PLUG
SEPARATING PLUG
STATIONARY MEMBER
ROTATING MEMBERS
PICK UP PLUG
VALVE DETAILS
③
As the drum rotates, each compartment goes through the same cycle of operation — filtering, dewatering, and discharging the cake — controlled in repeating sequence by the automatic valve.
②
The surface of the drum is divided into shallow compartments which are connected by pipelines to an automatic valve so that vacuum can be applied to each individually.
A spirally woven wire drainage member separates the cloth from the drum so that there is space for the mother liquor to drain from all parts of the compartment into the suction line.
Filtering outlet — to vacuum system
Discharge Roll
Agitator
Strings returning to underside of drum through aligning comb
①
CONTINUOUS ROTARY VACUUM FILTER consists essentially of a cloth-covered drum revolving in a tank filled with the slurry to be filtered. Agitator, oscillating gently back and forth under drum, keeps solids in suspension.

HOW THE FEinc GETS ITS

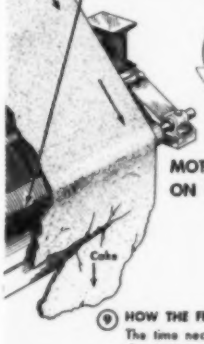
Here's the inside story of the famous FEinc Filter with the String Discharge that lifts the cake in one continuous sheet. No filtrate is blown back into the cake by compressed air—and there's no scraper to smear the cake into the cloth. This exclusive FEinc feature increases life of filter cloths, and permits use of lighter, more efficient fabrics. Cloth changes are faster, too, for there's no wire winding, and the strings actually help apply the new cloth.

Other features which can be added include the FEinc washing mechanism for cleaner cakes and higher recovery of solubles, and the FEinc compression dewatering mechanism that gets cakes 2% to 6% drier. Details in Bulletin 101 —why not look into it?

STRINGS EMBEDDED IN CAKE

8 **STRING DISCHARGE:** Endless strings spaced about ½" apart pass around the drum. The cake is built up over these strings so that, as they leave the drum, the cake is lifted away from the cloth by the strings.

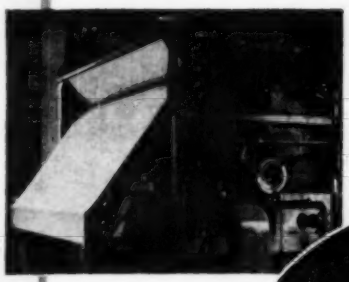
The strings then pass around the discharge roll. At this point the cake is freed from the strings. The strings are then led back over another roll to the under side of the drum.



MOTOR DRIVES LOCATED ON THIS END OF FILTER

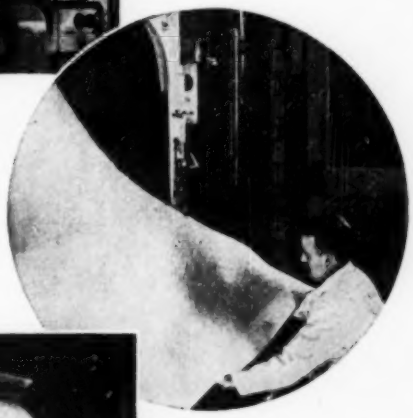
9 **HOW THE FILTERING IS CONTROLLED:** The time necessary for filtering and for dewatering vary with the particular slurry. In designing the filter, these needs are filled by proper balance between:

—Degree of submergence of drum
—Speed of rotation of drum
—Vacuum
—Selection of filter medium



Ceramics

FEinc Filter with String Discharge in ceramic industry



Penicillin

This FEinc chemical washing filter is totally inclosed for sterilization. Used throughout the penicillin industry

Soy Beans

Chemical washing filter delivering clean, firm cake of soybean protein. This filter includes FEinc compression mechanism.

ROTARY VACUUM FILTER
HIGH EFFICIENCY

Send for free Bulletin 101

FILTRATION ENGINEERS INC.

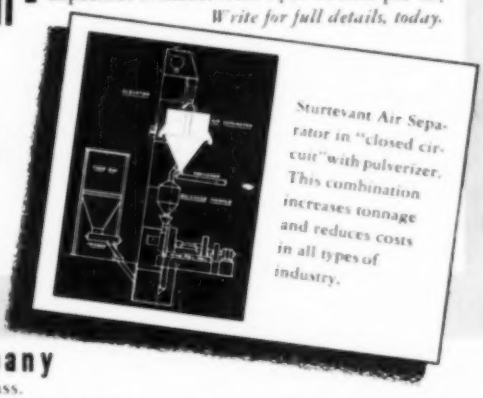
155 Oraton Street Newark 4, N. J.

Canada: The Northern Foundry & Machine Co., Sault Ste. Marie, Ont.

Here's How STURTEVANT Air Separators Increase Production of Fines... Lower Separation Costs

- Sturtevant Air Separators effect production savings by increasing output by 25 to 300% . . . reducing power consumption by as much as 50%.
- They efficiently carry off all classified materials in any desired fineness from 40 to 325 mesh and finer . . . eliminate the need of screening in certain applications.
- Capacities available from $\frac{1}{4}$ to 50 tons per hr.

Write for full details, today.



Sturtevant Air Separator in "closed circuit" with pulverizer. This combination increases tonnage and reduces costs in all types of industry.

Sturtevant Mill Company

100-A Clayton Street, Boston 22, Mass.

Designers and Manufacturers of CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS • MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

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USS

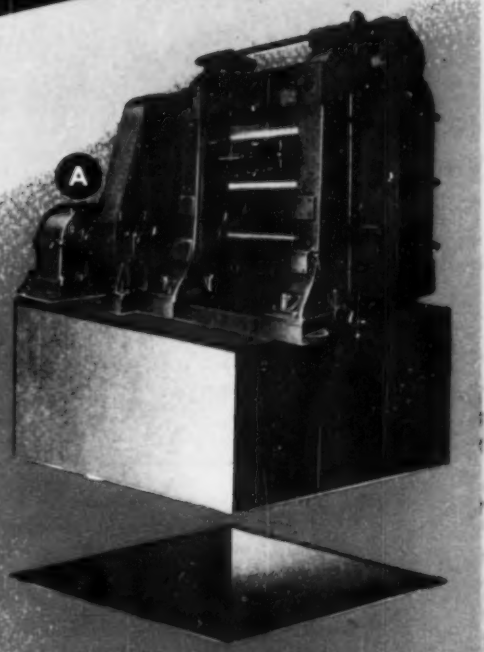
UNITED STATES STEEL

THESE CALENDERS WERE designed to plug holes IN PROCESSING EFFICIENCY

Farrel-Birmingham has maintained close contact with rubber and plastics processors since the earliest days of these two industries. The intimate knowledge gained through these relationships, combined with continuous technical research, has enabled the company to develop products which have kept pace with, or even anticipated, the changing needs of these industries.

The four calenders illustrated here are good examples of this pioneering policy. Each was designed to fill a real need—to plug a hole in processing efficiency.

Write for further information about calenders or any of the other equipment listed.



A 24" x 48" three-roll calender designed with substantial proportions and ample weight to withstand the severe service encountered in calendering stiff mechanical goods stocks. Housings, journal boxes and other parts are the same as would ordinarily be used for a 24" x 68" calender. Housings are of the arch type, of heavy box section, made of Meehanite* metal, a processed cast iron of superior physical properties.

B Designed for production that demands extremely accurate gauge and temperature control, the Farrel-Birmingham Z-type calender has a number of outstanding advantages: (1) Vertical pressure from a third roll cannot affect roll settings; (2) exposure of material in initial passes limited to a 90° arc of roll surface; (3) positive roll positioning provided by hydraulic pullbacks; (4) a built-in device which provides means for crossing the roll axes to compensate for deflection.

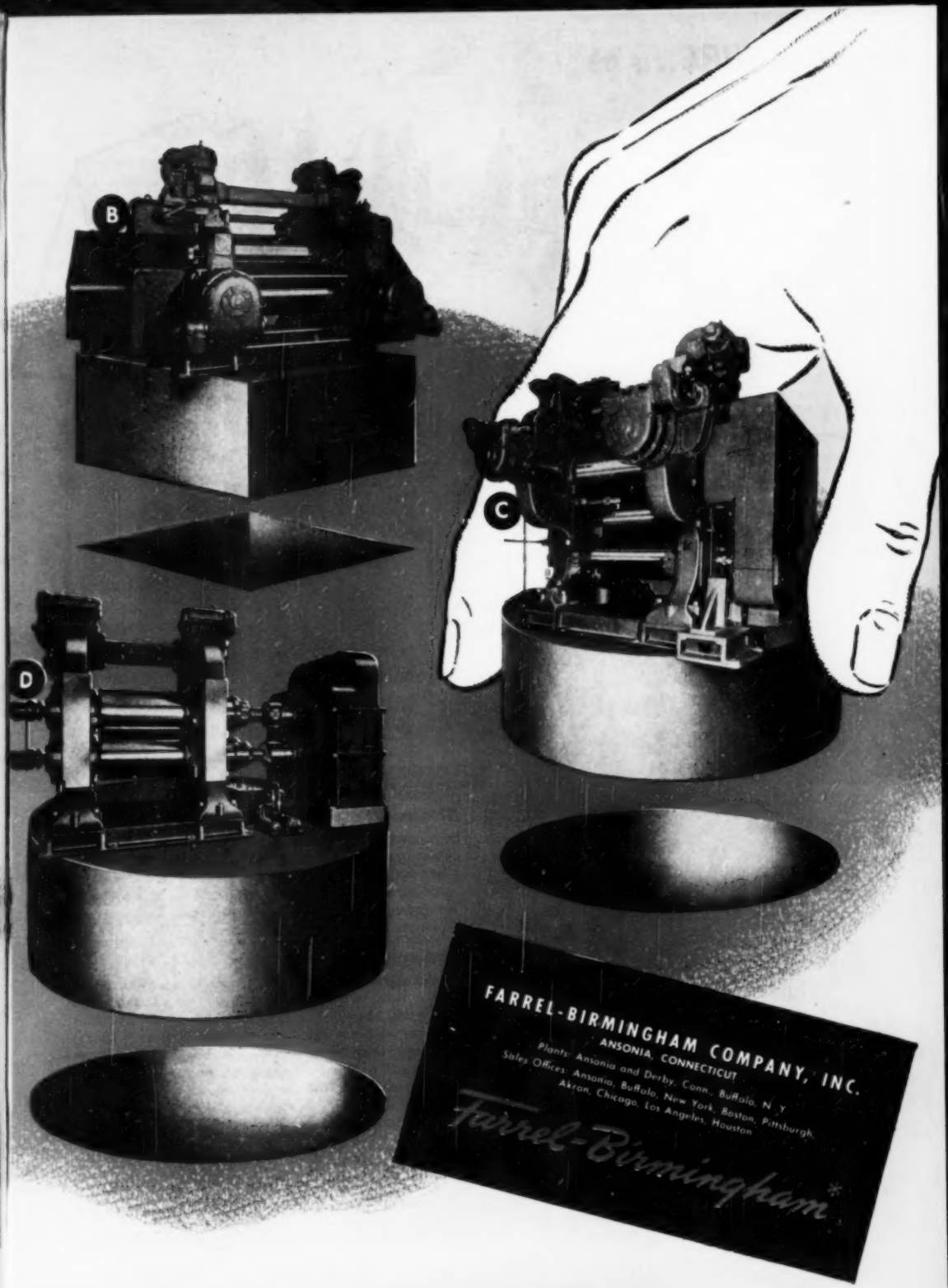
C In this four-roll plastics calender adjustment of the top, bottom and side rolls is by separate motor driving each screw through high ratio reduction worm gear units. Control is by push button; either end of a roll may be adjusted separately or both ends together. Opposite the bottom roll is a forged steel embossing roll equipped with air cylinders, valves and piping to provide pressure against the bottom roll.

D This 30" x 54" two-roll calender is specially designed for processing asphalt tile, with a variable speed range from 12 to 100 feet per minute, with even motion or friction between the rolls as desired. Adjustment of the top roll is motor-operated, with push-button control for adjusting either roll end independently or both together. A feature of this calender is the unit containing the drive and connecting gears, which are enclosed in a separate, fabricated steel housing. Rolls are connected to the gear stand by heavy, smooth-operating universals.

F-B* PRODUCTION UNITS

- Banbury Mixers
- Plasticators
- Pelletizers
- Mixing, Grinding, Warming and Sheeting Mills
- Bale Cutters
- Tubing Machines
- Refiners
- Crackers
- Washers
- Calenders
- Hose Machines
- Hydraulic Presses
- And Other Equipment for Processing Rubber and Plastic Materials

* *Registered Trade-marks*


B
C
D
FARREL-BIRMINGHAM COMPANY, INC.
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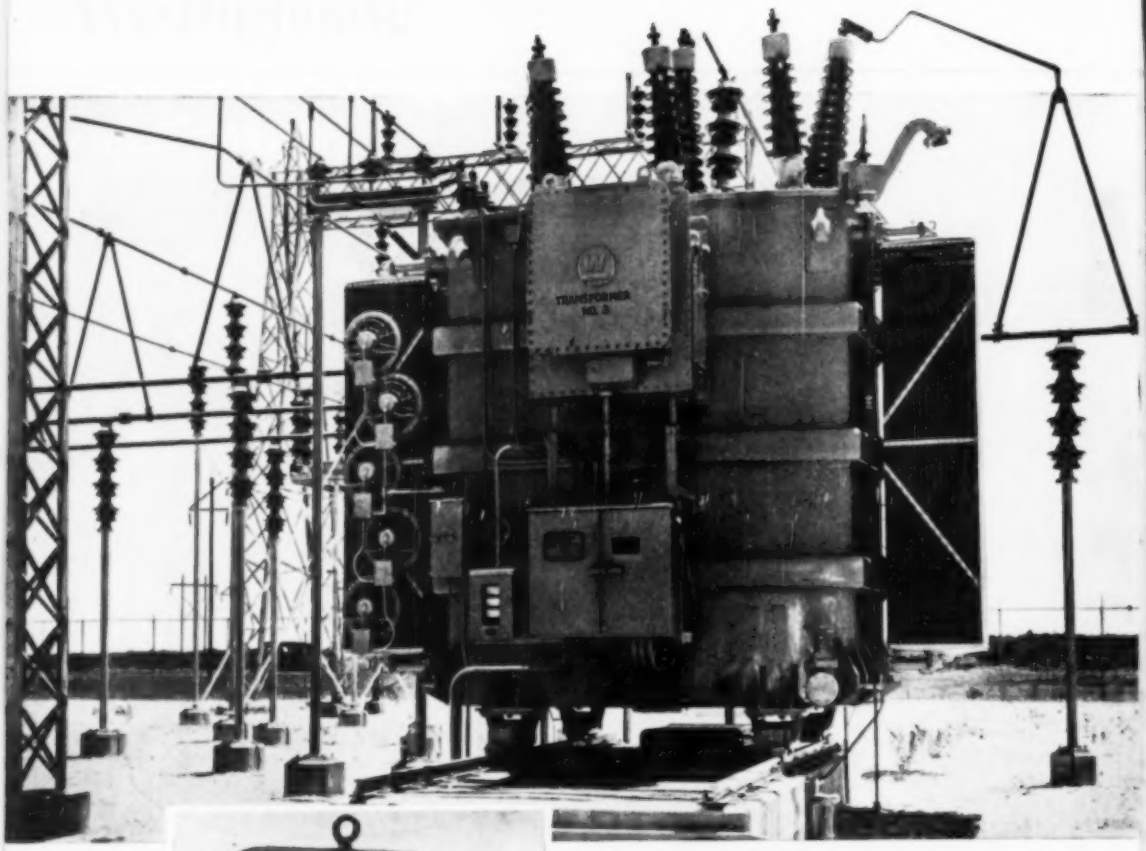
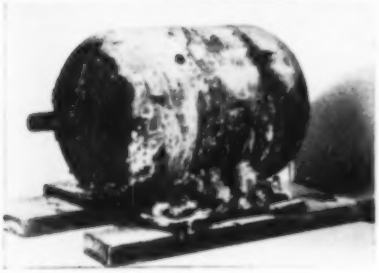
Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh,
Akron, Chicago, Los Angeles, Houston
Farrel-Birmingham*

YOU CAN BE **SURE**.. IF IT'S





This power transformer
in a chemical plant is an example of the corrosion-resistant equipment designed by Westinghouse for the Chemical Industry. To resist weather and corrosive conditions, all transformer tanks are Bonderized. All-welded construction assures positive protection against leaks, moisture or corrosive fumes.

The corrosion-resistance
of the specially coated, heavy steel, Life-Line chemical motor is shown by the results of this extended salt spray test. Shown here are a cast-iron chemical motor (above) and the Life-Line chemical motor (below) after operating for several months in a 20% salt spray. At the end of this time, the Life-Line motor continued to operate while the cast-iron motor had failed. An examination of both motors showed considerably less corrosion on the Life-Line motor.

We help you fight corrosion

To help the Chemical Industry combat corrosion, Westinghouse has developed an extensive line of corrosion-resistant electrical equipment. We use three ways to make this equipment resist the corrosion that may exist in your chemical plant:

Selecting Metals. For each kind of equipment, we choose the metal or alloy suitable for the application that will best resist corrosion. For example, nonferrous alloys are used liberally in making Type E turbines, Type V outdoor disconnecting switches and Ignitron rectifiers. Specially coated, heavy gauge steel is used on our Life-Line chemical motors.

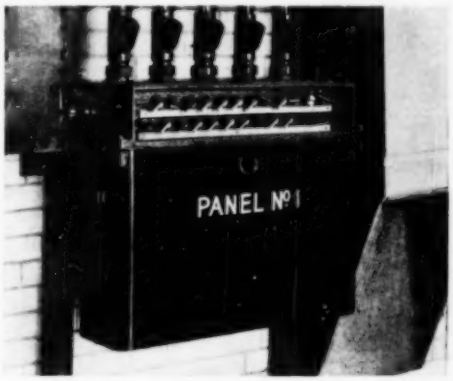
Oil Immersion. To give absolute protection against both corrosive and hazardous atmospheres, we make a wide variety of oil-immersed equipment. This includes oil-immersed power transformers, panelboards, circuit breakers, linestarters and pushbuttons.

Protective Coatings. To prevent corrosion from creeping back under the paint film when a scratch occurs, we Bonderize the enclosures of Westinghouse switchgear, transformers and control equipment. To further protect our outdoor switchgear from corrosion, we also give it an all-weather undersurface coating.

Westinghouse has Chemical Industry Specialists who will gladly help you with the solution of the electrical problems in your chemical plant.

Call your nearest Westinghouse District Office, or write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

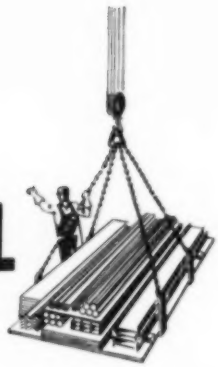
J-94805



In this oil-immersed, nofuze "De-ion" breaker panelboard, each breaker is completely submerged in oil and operated by an external handle through a gland-type bushing. This provides a corrosion-resistant and explosion-proof panelboard.

Westinghouse

For STEEL



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ESTABLISHED 1902 SIDNEY D. KIRKPATRICK, Editor

Chemical Engineering

WITH CHEMICAL & METALLURGICAL ENGINEERING

SEPTEMBER 1949

Accent on Integration

Our chemical process industries have become accustomed to an accelerated growth resulting from war and postwar conditions. This has naturally given rise to a somewhat disjointed industrial economy. It is time to pause and size up the results—and again to emphasize growth by integration. Nowhere is this needed more than in the West. And nowhere are the opportunities for better industrial integration more evident.

INTEGRATION IS THE WEST'S OPPORTUNITY

This month's *Chemical Engineering* report—Western Balance—highlights some of the gaps in this young and lusty region. It points up the fact that the big opportunities in that area west of the Rockies now lie in better correlation of output and needs. A rounding out is needed for industry segments and for raw materials supply and demand. The firms that will be able to capitalize on these needs are those that follow most closely the area's changing industrial mosaic. They will move first to fill in the gaps as they appear. They will see the long-range logic of a modest start and the wisdom of growing with the area.

Better unity of our western economy is not solely an opportunity for private enterprise. It is also the duty of far-sighted individuals throughout the country. No nation and no region can be truly strong until it is balanced in all its parts. This equilibrium is necessary for national security. It is necessary—though perhaps not so obviously—for a healthy peacetime economy. And, increasingly important, it can quiet socialism's cry that things are out of joint—a yelp that has already been heard on the Coast.

WESTERN GROWTH IS WESTERN RESPONSIBILITY

Many phases of any such program fall squarely on the shoulders of all Westerners. They will recognize that the West's economy can not stand alone. It must be united with the greater economy of the nation. There must be sound reasons for every new piece added to the area's mosaic.

The West knows that inter-regional plans must be coordinated on an increasing scale. Much progress has been made in recent years—more is needed to remove cross-purpose promotional activities. Every new industry or enterprise must find the best possible location if it is to become an asset to the whole region and to the nation.

But to do this it must have specific and accurate data on many localities. Information now comes piecemeal and often fragmentary from many sources or must be dug up by private surveys at considerable expense. It is disheartening to try to get, for example, an up-to-date quantitative and qualitative picture of raw material resources. A few state organizations are excellent sources, but are limited by state boundaries. The Raw Materials Survey in Portland, a privately financed non-profit organization, is a step in the right direction. The idea might be extended to cover the entire West.

Other organizations are making progress in filling in the gaps of information on the West's assets and needs. Stanford Research Institute has undertaken to integrate research activities and facilities. The Western Chemical Market Research Groups are off to a good start. The Pacific Chemical Exposition and Industrial Conferences, which did an outstanding job in 1947, promises more meaty sessions in November of this year. Other private groups are adding their bits and pieces to help fill in the picture. In the West, the emphasis is again on better integration all along the line.

John R. Callaham

JOHN R. CALLAHAM, EXECUTIVE EDITOR

Synthetic Zeolite

This old product has taken on new life because: (1) an ingenious drying technique cut production costs; (2) then a novel service plan opened up a big household market. The pictured flowsheet on page 140 shows how this water softener is now made.

The Culligan plant. Only one other producer uses solar evaporation.

SYNTHETIC ZEOLITE IS BIG BUSINESS—AND CULLIGAN IS THE BIGGEST IN IT.

The story of Culligan Zeolite reflects the personality of Emmett J. Culligan, founder and president, a dynamic ex-farmer with an uninhibited Irish imagination. Back in 1924, Culligan had the idea that synthetic zeolite could be dehydrated more economically by the sun than by the costly process then used. He tried out his idea first in Arizona. Then in 1936, with $50 in his pocket, Culligan leased two miles of abandoned paved streets from the astonished city council of Northbrook, Ill. He filled the empty streets with zeolite gel, and let the sun do the rest. This technique greatly increased the volume of output and slashed manufacturing costs.

But sales did not increase in proportion—until Culligan was smitten with a second idea: Why not make water softeners available to households on a service basis, using franchised dealers? The idea worked. One city now has more Culligan soft water tanks than telephones. By the end of the war, Culligan had 125 franchised soft water service dealers. Now he has about 1,000; they serve over 2,500 communities in the United States, Canada and Alaska. Last year, Culligan had some 500,000 installed household units that softened about 10,000,000,000 gal. of water for some 2,000,0000 people. In recent years new household units have been put in at the rate of 100,000-150,000 a year.

Six plants (see table) in the United States now have a capacity for making approximately 50,000,000 lb. of synthetic zeolite annually; Culligan's San Bernardino plant has about 50 percent

Refined Natural	Plant Location
Inversand Co.	Clayton, N. J.
Permutit Co.	Birmingham, N. J.
Zeolite Chemical Co.	Medford, N. J.
Synthetic	
Arizona Minerals Corp.	Yuma, Ariz.
Culligan Zeolite Co.	San Bernardino, Calif.
Infilco, Inc.	Chicago, Ill.
National Aluminate Corp.	Chicago, Ill.
Permutit Co.	Birmingham, N. J.
Research Products	Madison, Wis.
American Zeolite Corp.	New York, N. Y.

of this total capacity. In addition, three plants turn out a refined natural zeolite (greensand) for water softening use. Total output of the natural zeolite normally amounts to 10,000,000-15,000,000 lb. annually.

It's interesting to know that the synthetic zeolite production capacity in this country is still possibly four times greater than the capacity for synthetic resin ion exchangers. In 1947, about 7,874,000 lb. of plastics materials (net resin content only) was made for use in ion exchange while some 30,000,000 lb. of synthetic zeolite was manufactured.

HARVESTING ACRES OF ZEOLITE

Culligan soon couldn't find enough abandoned streets in Northbrook. So in 1941 he built his new plant at San Bernardino—probably the largest of its kind in the world. It has 37 acres of drying beds and a capacity of about 25,000,000 lb. yearly of synthetic zeolite. The Culligan plant at San Bernardino and the Yuma plant of Arizona Minerals Corp. are the only ones that use solar evaporation for drying zeolite. About 95 percent of Culligan's output ends up in household softening units; the rest goes into business and industrial units.

Why did Culligan pick San Bernardino for his plant? One reason was predominant: climate. He wanted to capitalize on the Mohave, where ambient temperatures often reach 115 deg. with 5-10 percent relative humidity. Using the evaporative heat from the sun under such conditions meant dollars and cents could be slashed off the cost of processing every ton of zeolite. This climate also allowed a cheaper, more open type of building.

Other reasons were important but less dominant: (1) the area had a good supply of intelligent workers, (2) it was near Los Angeles, a rapidly growing hard-water population center; (3) it was only 65 miles from a source of sodium silicate, which amounts to 85 percent of the total tonnage of shipped-in raw materials; (4) it had railroad facilities that were convenient for national distribution of the product.

JOHN R. CALLAHAM

Zeolite—refined natural and synthetic—has been used for softening water for almost half a century; synthetic zeolite itself has been made in this country since 1908. But the large-scale use of zeolite for water softening in the American home (75 percent of American homes have hard water) did not come about till the last decade. The growth of the synthetic zeolite industry since that time has been closely tied in with the growth of one firm—Culligan Zeolite Co. at San Bernardino, Calif. Culligan is now the largest domestic producer.

Capacity operations at San Bernardino, says Plant Manager Phillip H. Sunnes, require annually some 1,350 tons of Na_2O as caustic soda, 2,150 tons of water-free bauxite and 19,000 tons of 42 Be. sodium silicate. The usually accepted formula for zeolite gel is $Na_2O{\cdot}Al_2O_3{\cdot}6SiO_2{\cdot}xH_2O$

Raw materials for synthetic zeolite are 50-percent caustic soda, 42 Be. sodium silicate, and bauxite with 1 percent water or less. First step in the process is to react the NaOH and the bauxite in mechanically agitated cookers to form sodium aluminate. Culligan has three 6x6-ft. aluminate cookers, each with a capacity of about 700 gal. of finished sodium aluminate. The vessels are constructed of black iron; there is no corrosion problem. The cookers are automatically controlled and gas-fired. The caustic storage tank has a capacity of 13,000 gal.

Bauxite and caustic are weighed on a dial scale. The NaOH is fed into the cookers first and brought up to a boil; then the bauxite is added. It takes about 2.5 hr. to bring the NaOH up to heat, about 45 min. to add the bauxite and 45 min. for the reaction to take place at about 240 deg. F. The sodium aluminate comes out at about 51 Be. and with 20 percent excess caustic. It is sent by an all-iron centrifugal pump to one of three aluminate storage tanks.

SOLAR EVAPORATION

Just before use, the aluminate is sent by a centrifugal pump to an overhead storage tank that feeds into the two-compartment transfer truck. Sodium silicate from the 20,000-gal. raw material storage tank is also sent into another overhead storage tank that feeds into the same transfer truck. This takes it to the pouring rig for spreading on the drying basins.

Concentrated silicate and aluminate from the transfer truck are pumped into a two-compartment storage tank at the bottom rear of the pouring rig. Each chemical is pumped separately into two measuring tanks atop the rig, then dropped into a two-compartment water dilution tank. Then, by means of quick-operating valves, the two diluted solutions are quickly dropped together into the mechanically-agitated mixing tank and mixed for about one minute. A quick-operating foot valve drops the zeolite mixture into a metal spreader box on the cement-topped asphalt drying bed. Each spreader section will hold about 500 gal. of solution which, at this stage, is about 95 percent water. These operations are carried out by means of a power take-off on the transfer truck. Biggest problem in this operation is the packing in the silicate pumps; they have to be repacked once every two weeks, states Superintendent H. E. Ochler.

The drying beds are about 6 in. deep and 20 ft. wide—and cover 37 acres. They can be used for drying purposes 10 months per year. As poured, the zeolite solution has about 95 percent free water. After drying in the sun for 12-14 days in the summer and 30-35 days in the winter, the material has 45-50 percent water of formation—but has no free water. After pouring, the gel sets in about one minute, after which the retaining frame is lifted. Each 500-gal. pour gives about 310 lb. of finished zeolite.

At the end of about one-fourth of the drying period, the caked material is water-washed by sprinklers to remove soluble salts. Otherwise, when fully dried and moistened, the product will decrepitate into too large a proportion of fines. On the other hand, if washed and dried properly, the the wetted product will decrepitate into about the right screen size. Since the depth of the basins affects the drying time, they were laid out with extreme care and uniformity—not more than 4-in. deviation from level in 20 ft. The completely dried zeolite is swept up with a mechanical rotary broom, loaded into a truck and taken to the mill house.

FINISHING OPERATIONS

The trucks dump the granular raw zeolite into a hopper with a drag-vevor which takes it to a bucket elevator feeding into an ordinary cone-bottom steel storage tank with a capacity of 450,000 lb. A vibrating feeder takes it to another elevator that feeds two Rotex shakers. These are two-deck screens; the first screen is 8-mesh, the second a 50-mesh stainless steel screen. Rubber balls are between decks for keeping screens clean.

The fines (—50 mesh) are discarded; the 8-50 mesh material goes to a hydraulic classifier. Coarse material (+8 mesh) goes to a roll mill; this is actually a two-high flour mill with steel rolls corrugated with Le Page corrugations. From the crusher, the material goes to another similar Rotex screen; fines are discarded; oversize is recycled to the crusher, while 8-50 mesh product goes to the hydraulic classifier.

The classifier is a four-compartment unit with water upflow. Its purpose is to take out sand that has mixed with the zeolite. Sand settles out in each compartment and is removed. The zeolite-water slurry overflows into a four-door dividing box that feeds the four washers by gravity.

In the cone-bottom washers, wash water is fed into the cone through a distributor, flows upward countercurrent to the zeolite slurry and overflows at the top of the tank. This washing removes all but traces of soluble salts. The finished zeolite slurry (somewhat like a sand slurry) settles into the cone and is pumped by a centrifugal pump into three retaining tanks. Here the zeolite settles out while the water is removed by overflow boxes placed near the bottom of the tanks. Finished zeolite is dropped through sliding gates and vibratory feeders to a belt conveyor that takes it to the bagging operations.

Finished zeolite of 8-50 mesh is automatically weighed into burlap bags and sewed. These are (1) loaded into freight cars and shipped to Culligan's tank-filling plant in Illinois, (2) filled directly into household service units at San Bernardino, or (3) shipped to dealers in bulk for commercial and industrial consumers.

The San Bernardino filling plant is a replica of the one in Northbrook, Ill. It has two batteries of 10 filling hoppers each; 90 lb. of zeolite is dumped into each of the 20 hoppers and falls by gravity into the service tank units. These are galvanized steel cylinders some 9 in. dia. and 42 in. long; each holds 90 lb. of zeolite. Each unit has a water inflow and outflow pipe. One tank will soften 10-grain water for an average four-person family for about 28 days.

At the time of capacity exhaustion, the Culligan dealer takes out the unit and puts in a fresh one. The spent zeolite is backwashed, regenerated in the unit with a saturated NaCl brine, sterilized with calcium hypochlorite and is ready for use again.

JOHN R. CALLAHAM, *formerly* Chemical Engineering's *Pacific Coast Editor, wrote his "Culligan story" just before he came East six weeks ago to become our new Executive Editor.*

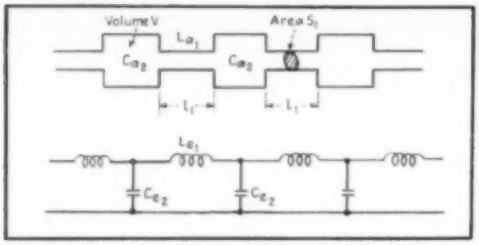


Fig. 1—Type I acoustic filter, and electrical analogue.

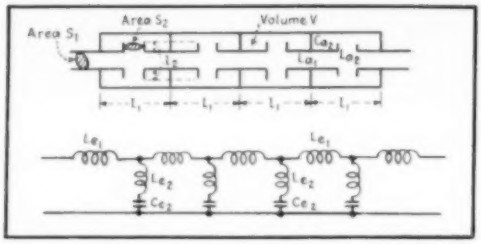


Fig. 2—Type II acoustic filter, and electrical analogue.

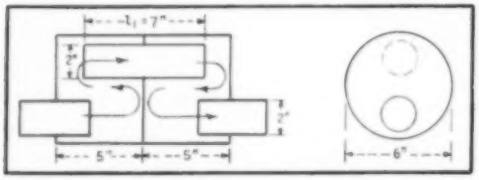


Fig. 3—Design for a Type I acoustic filter.

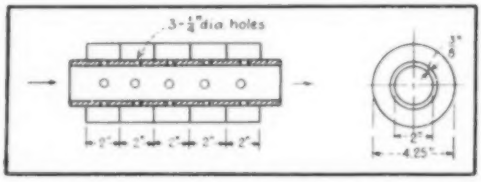


Fig. 4—Design for a Type II acoustic filter.

Design of an Equipment Silencer

Compressors, engines, vacuum pumps and other sorts of equipment can be silenced with properly designed acoustic filters

MARTIN HIRSCHORN

An acoustic wave filter is a device which permits the passage of certain wave frequencies, while eliminating other undesired frequencies. Thus, it can be used to reduce or eliminate noise originating in certain types of equipment.

There are various types of wave filters such as low-pass, high-pass, band-pass and band-elimination filters. This paper will be concerned only with low-pass acoustic filters.

A low-pass filter will give fairly good transmission to frequencies from zero to the cut-off frequency and approximately zero transmission to higher frequencies over a certain range, depending on the design characteristics of the filter.

MARTIN HIRSCHORN, *an engineer formerly with the* M. W. *Kellogg Co., has recently organized the Industrial Acoustics Co., of New York.*

Acoustic low-pass filters are of particular interest in the design of mufflers or silencers for reciprocating engine exhaust or discharge pipes, ventilator ducts and a number of other special applications. For example, they can be used in blower suction and discharge piping, in steam engine exhaust lines, in vacuum pump discharge and compressor suction piping. They may be used to silence safety valve and rupture disk blow-offs for any gas or vapor released to the atmosphere. A similar design principle is used for vibration dampeners in closed compressor piping. Suitable acoustic filters can be designed also to solve the oil refinery noise problem presented by gas discharge from regenerator vent stacks in catalytic cracking units.

Such filters are especially useful where sufficient noise suppression cannot be obtained by lining the exhaust pipes with sound absorption material.

The audible frequency range is generally considered to lie between 16 cycles and 20,000 cycles per sec., the human ear being most sensitive to the range lying between 500 and 5,000 cycles per sec. The former range gives the extreme frequency limits with which this discussion of acoustic filter design will be concerned.

The solution of the problem presented here will be valid only for the attenuation of a particular disturbing noise frequency. To predict the elimination of a specific frequency range requires more complex treatment than will be given here and is often best accomplished with the aid of actual experiments.

The basis for acoustic filter design is comparison to an electrical wave-filter network, from which equivalent acoustical analogues have been developed. The cut-off frequency for a low-pass electrical wave-filter network is given by:

$$f = 1/(\pi \sqrt{L_e C_e})$$

where L_e is the inductance in henries, and C_e is the capacitance in microfarads.

On substituting the acoustical equiv-

alents for L_s and C_s, Eq. (1) is obtained.* There is thus a considerable similarity between an electric wave-filter circuit and an acoustic wave-filter circuit. In general, analogues can be established between electrical, mechanical and acoustical wave systems.

SUMMARY OF DESIGN EQUATIONS

Eqs. (1) and (2) refer to two different types of acoustic wave filters, Types I and II respectively, as shown in Figs. 1 and 2. Proofs of these equations are given in the footnote*. Eqs. (3), (4) and (5) are comparatively well known and are given here for convenience.

$$= \frac{V_a}{\pi} \sqrt{S_t / l_t V} \qquad (1)$$

$$f \sim \frac{V_a}{\pi} \sqrt{\frac{S_t}{l_t V} \left(\frac{1}{1 + 4S_t/\sigma l_t} \right)} \qquad (2)$$

where $c = \pi r^2 / l_t + \pi r/2$), which becomes S_t / l_t if $\pi r/2$ is small compared with l_t.

$$V_a = \sqrt{144\, k\, P\, g\, \rho} \qquad (3)$$

$$\rho = MP/10.73\, T \qquad (4)$$

$$\lambda = V_a / f \qquad (5)$$

DESIGN ILLUSTRATION

It is required to design an acoustic filter for a pipeline, connected to the atmosphere, having a diameter of 2 in. The disturbing noise has been analyzed to have a frequency of the order of 350 cycles per sec. The gas discharge has the following properties: $P = 14.7$ psia.; $T = 600$ deg. F. + 460 = 1,060 deg. F. abs.; $k = 1.4$.

Inspection of Eqs. (1) and (2) will indicate that a dimensionally smaller or more economical design can be obtained with Eq. (2); however, from an acoustical point of view, the Type II filter is more selective than Type I which attenuates frequencies over a wider range. Generally speaking, Type II is also more suitable for a high-velocity, erosive discharge, as from safety valves. The selection as to which type to use will depend on the particular problem to be solved. Calculations will be shown for both Types I and II.

Type I Filter—From Eq. (4), $\rho = 29 \times 14.7/(10.73 \times 1{,}060) = 0.0374$ lb. cu. ft. From Eq. (3), $V_a = (1.4 \times 14.7 \times 144 \times 32.2/0.0374)^{\frac{1}{2}} = 1{,}600$ fps. Area $S = 0.7854 \times 2^2/144 = 0.0219$ sq. ft. Then, from Fig. 3, take $l_t = \frac{7}{12}$ in. = 0.585 ft. and V as $0.7854 \times 6^2 \times 5/1{,}728 = 0.082$ cu. ft. Substituting in Eq. (1), $f = (1{,}600/\pi)\,(0.0219/0.585 \times 0.082)^{\frac{1}{2}} = 345$ cycles per sec. (Although it is not suitable for design purposes, Fig. 5 shows how the cut-off frequency varies with the velocity of sound and the dimensions of a Type I filter.)

The cut-off frequency of the filter of Fig. 3 is therefore 345 cycles per second and this frequency, as well as a range of higher frequencies, will be considerably attenuated by this design. The filter consists of two sections which should be considerably shorter than the cut-off wave length. Using Eq. (5), $\lambda = 1{,}600/350 = 4.56$ ft. or 55 in., which is large compared with 5 in.

Type II Filter—Refer to Fig. 4, where an acoustic filter consisting of five sections is shown; each section has three ¼-in. diameter orifices. Here $S_t = 0.7854 \times 2^2/144 = 0.0219$ sq. ft.; $l_t = 2$ in. = 0.167 ft.; $l_s = 0.375$ in. = 0.0313 ft.; and $r = 0.125$ in. = 0.0104 ft. Again $V_a = 1{,}600$ fps The term c for Eq. (2) $= \pi \times 0.125^2/(0.375 + \pi \times 0.125/2) = 0.086$ in. = 0.0072 ft. Volume $V = 0.7854 \times 2 \times (4.25^2 - 2.375^2)/1{,}728 = 0.0113$ cu. ft. Then substituting in Eq. (2),

$$f = \frac{1{,}600}{\pi} \sqrt{\frac{0.0219}{0.167 \times 0.0113}} \left(\frac{1}{1 + \frac{4 \times 0.0219}{3 \times 0.0072 \times 0.167}} \right)^{1/2}$$

= 346 cycles per sec.

This design should also be effective in attenuating disturbing noise frequencies in the neighborhood of 350 cycles per sec.

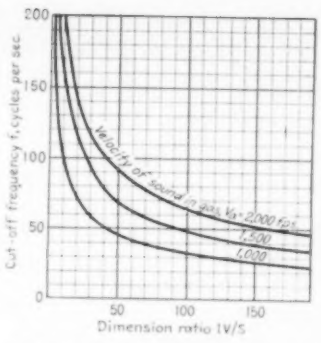


Fig 5—Cut-off frequencies for Type I filters, vs. velocity of sound and filter dimensions.

DESIGN CONSIDERATIONS

The number of sections to be used in any particular case depends on the degree of noise attenuation required. Equipment location is important since in some circumstances it is actually possible to produce a resonating condition, and sound amplification. Furthermore, designs can be modified to give either large or small pressure drops.

Ideally, the transmission curve for an acoustic filter would look as indicated in Fig. 6; however, in practice the curve will have a much more irregular appearance.

The range of inaudibility after the cut-off point will depend, among other factors, on the general dimensions of the filter, such as the ratio between the outside chamber diameter and the main line diameter, as well as on the number of orifices used. By taking into account all the possible factors involved, a successful filter can be computed, though application of a good knowledge of acoustic principles is essential.

NOMENCLATURE

- f = Cut-off frequency, cycles/sec.
- g = Gravitational acceleration constant, 32.2 ft./sec.²
- j = Operator in vector notation, rotating vector 90 deg.
- k = Ratio of specific heats.
- l_t = Length of narrow duct, ignoring end correction, ft.
- l_s = Length or thickness of side orifice, ft.
- r = Radius of side orifice, ft.
- C_a = Capacitance, acoustical, cm.⁵/dyne.
- C_e = Capacitance, electrical, microfarads
- L_a = Inductance, acoustical, gm./cm.⁴
- L_e = Inductance, electrical, henries.
- M = Molecular weight of gas.
- P = Pressure, psia.
- T = Temperature, deg. F. abs.
- S_t = Area of cross-section of narrow duct, sq. ft.
- S_s = Area of cross-section of side orifice, sq. ft.
- V = Volume of capacitance, cu. ft.
- V_a = Velocity of sound in gas, fps.
- Z_1 = Series reactance.
- Z_2 = Shunt reactance.
- λ = Wave length of frequency f, ft.
- ρ = Density of gas, lb./cu. ft.
- ρ_0 = Density of gas at std. conditions, lb./cu. ft.
- ω = Angular velocity = $2\pi f$, radians/sec.

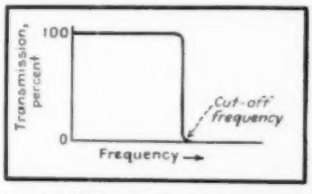


Fig. 6—Idealized transmission curve for a low-pass acoustic filter.

REFERENCES

1. Stewart, G. W., Acoustic Wave Filters, *Phys. Rev.*, **20**, No. 6, 528 (1922).
2. Olson, Harry F., "Dynamical Analogies," p. 92, D. Van Nostrand & Co., New York (1943).

*For an orifice $L_a = \rho_0 c$, where c is the conductivity as defined above. For a straight tube this reduces to $L_a = \rho_0 l/S$.

Proof of Eq. (2): Treatises on wave filters show that the limiting values for no attenuation are determined by: $Z_1/Z_2 = 0$ and $Z_1/Z_2 = -4$. Inspection of the acoustical network of Fig. 2 indicates that $Z_1 = j\omega L_{a1}$ and $Z_2 = j\omega L_{a2} - 1/\omega C_{a2}$. Substituting these values in the second limiting expression above, $Z_1/Z_2 = -4 = j\omega L_{a1}/(j\omega L_{a2} - j/\omega C_{a2})$. Since $\omega = 2\pi f$, then

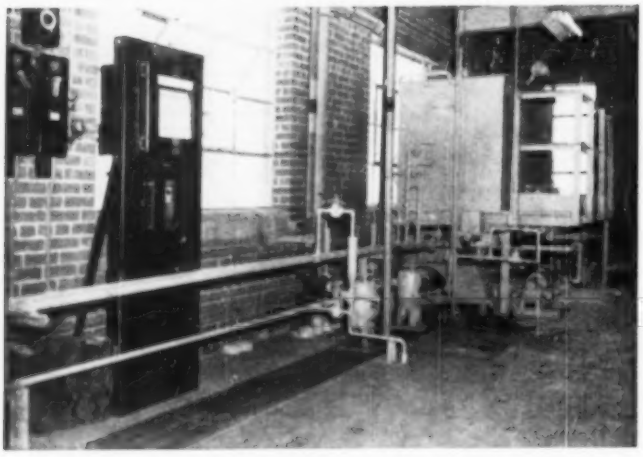
$$f = \frac{1}{\pi} \sqrt{\frac{1}{L_{a1} C_{a2} + 4 L_{a2} C_{a2}}}$$

on substituting for L_{a1}, L_{a2} and C_{a2}, Eq. (2) is obtained. Eq. (1) can be obtained similarly when $Z_1 = 1/j\omega C_{a2}$.

These three pictures give the caustic and chlorine to form

1.

Cyanide and acid wastes are siphoned from plating tanks.

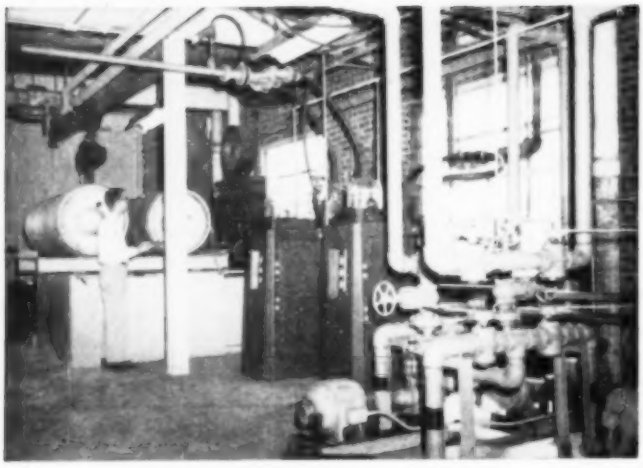


2.

They enter a long concrete flume under the grating. The two agitators mix in caustic and chlorine.

3.

Caustic is added from square mixing tank above entrance end of flume.



4.

Chlorine gets to flume via this standard chlorinating unit.

5.

Net result: CN radical is converted to harmless CO_3 and NH_4 ions.

gist of the operation: Break cyanide down with ammonium carbonate

Cyanide Waste Disposal: Platers Call New Installation "The Model System"

ROGER WILLIAMS, Jr.

It may seem strange that a metal flashlight plant would have a chemical problem, but that is just what National Carbon Co. had when it began laying out its new St. Albans, Vt., plant. The chemical problem was the disposal of chemical wastes from the various plating and cleaning operations—most important, disposal of cyanide solutions. The problem was solved chemically, and this plant is now a model for the elimination of cyanide plating wastes.

The operations of producing finished flashlights from sheet brass involve several chemicals that are hazardous to dispose of. Some of them are acids like sulphuric and nitric, plus cyanides, chromates, and solutions of metal salts including nickel, silver, copper, potassium and others. In treating waste waters to remove most of the metal ions the answer is simple—add caustic and precipitate the oxides or hydroxides. For cyanides, just caustic addition will not work.

The method used by National Carbon to eliminate cyanides is a simple one, on paper. The chemistry is not simple and there were real design problems involved before the process was a success. The actual mechanism of the chemistry involved is complex, but here is the overall reaction that occurs:

$$2H_2O + 2KCN + 2Cl_2 + 4NaOH \rightarrow (NH_4)_2CO_3 + K_2CO_3 + 4NaCl$$

Thus, by adding controlled amounts of caustic and chlorine, the cyanides are broken up into harmless carbonate and ammonium ions. It sounds easy. Here is the way it is done at National Carbon.

There are three separate drain systems in the plant. The first is a cast iron sewer for dumping of strong cyanide solutions. The second is a Duriron sewer which handles the majority of the wastes, general overflow from the chemical solution tanks, and washing waste water. The third is a Duriron sewer which handles strong acids. This latter sewer is a separate system from the first two and will be discussed later.

Flow through the main sewer, the second one mentioned above, averages about 250,000 gal. per 8-hr. day and contains small but significant quantities of cyanide plus several other metallic ions. The flow is continuous, but the metal and cyanide contents can and do vary sharply at times. The concentrated cyanide sewer carries intermittent flows, but total flow is about 3,000 gal. per month. These intermittent flows occur when a cyanide plating or rinsing bath is dumped for cleaning or to change the solution; and these dumps are scheduled in advance. The trick that National Carbon uses to even out the waste disposal operation is to proportion the strong cyanide solution in with the main sewer flow, hence having to work only on dilute cyanide solutions.

Strong cyanide dumps flow to a steel tank of 4,500 gal. capacity, located within the main waste disposal building. Since the flow is intermittent, this tank serves as storage for the system. From this tank the strong cyanide solution is metered with a Milton Roy pump into the main water stream as it enters the building.

Water from the main sewer enters the waste disposal building and spills into a long concrete flume, some 18 in. wide, 35 ft. long, and with a water level of about 30 in. Along this flume there are several weirs to give better mixing of the waste and the additives.

The first thing added to the waste waters is caustic. Caustic is purchased in drums as a solid. It is weighed out batchwise and dissolved in one of the three sections of a dissolving tank, This tank, made of mild steel, is situated above the flume where the water enters the building. One section is feeding caustic solution to the flume below, one section is standby, and the third section is dissolving caustic. The dissolving is aided by a mixer which can be slid along the edge of the tank from one section to another.

From this caustic tank, the alkali solution flows into the flume by gravity through a control valve. This control valve is actuated by a pH controller located farther up the flume. There is some question on the advisability of controlling the caustic without taking into account the total amount of chlorine to be added, but control is not too critical because of the possibility of final batch neutralization discussed below.

From the caustic addition point, the water passes over a weir and

ROGER WILLIAMS, JR., *came to Chemical Engineering by way of Amherst, M.I.T., and Du Pont. He is an assistant editor.*

through a section of the flume which has an agitator to give additional mixing. After flowing under another weir, the water enters the part of the flume where chlorine is added.

Chlorination is applied by a standard type chlorinator, which may be automatically controlled by the volume of the water flow in the flume or by manual control independently. The water feed to the chlorinator consists of treated waste water, but there is an auxiliary system provided using St. Albans city water in case the feed pump breaks down. Chlorine is purchased in large pressure cylinders. These arrive at the plant on flat cars or trucks and are stored outside the waste disposal building. Two cylinders are maintained inside the building, one in service and a fresh one ready to be used. The cylinders are moved into the building and out by means of a monorail and chain falls. All chlorine-water piping is hard rubber to protect against corrosion.

After chlorination, the waste water enters another agitated section of the flume, an area sectioned off by under-and-over weirs. From this point on down the rest of the flume length mixing and neutralization occur, and the cyanide-caustic-chlorine reaction takes place.

FLUME COVER NECESSARY

One interesting fact about this flume is that it had to be covered. Originally it was merely covered with a grating. Now sheet metal plates have had to be placed over the flume and additional ventilation installed. It seems that infrequently there is a side reaction; why it occurs occasionally no one knows. The trouble is that this reaction produces nitrogen trichloride, which is a very effective tear gas.

Water from the flume, essentially completely neutralized, now flows to one of two detention tanks. These are underground cement tanks of 30,000-gal. capacity, or about one hour's hold-up. These tanks are each filled, alternately, and batch treated when necessary with additional caustic and chlorine solution to complete the neutralization. Then they're dumped to a settling basin. The tanks are long and narrow and are divided into four sections. Because the waste water now contains precipitated metal salts, the contents of a tank being further treated is constantly agitated. This is done by pumping liquid from section number one to section number three, and from section number four to number two, by means of two centrifugal pumps. The water in the tank levels out by means of bottom openings between the various sections. Caustic solution addition to these tanks is gravity fed. Chlorine addition is by means of a second chlorinator identical with the one described above. These detention tanks provide a valuable safety factor in a process system which can often operate without supplementary treatment and is on the whole 80 percent continuous.

The precipitated metal salts and other solids in the water are now removed by settling. The waste flows batchwise to a settling basin which is a cement tank 40 ft. wide and 100 ft. long. At the entrance end it is 4 ft. deep, and is 5 ft. deep at the discharge end. The waste containing the solids is distributed across the tank at the inlet end so that it flows over a weir and down the basin as a sheet depositing solids as it goes. The clear liquor overflows a weir at the deep end into a tile sewer leading to the city sewer system. The final clear water runs 1 to 3 mm. of free chlorine, is free of cyanides, and mildly alkaline.

It was originally the intention to remove sludge from the settling basin at predetermined periods. This heavy sludge was then to be filtered in a plate-type pressure filter and when dewatered trucked away to a dump. The sludge as precipitated, however, had very poor filtering qualities. Filter aid and chemical sludge treatment were considered but were felt to be uneconomical.

Present practice is to let the sludge accumulate to a given level and remove it over a week end, when the main producing plant is shut down. The sludge is removed by pumping with a diaphragm pump out to a lagoon built of dirt moved with a bulldozer. After the sludge has been in this lagoon for a time, the residual water dissipates into the ground and the cake left can be trucked to a dump. Total sludge produced averages 2,200 cu. ft. per month.

The entire process is under careful laboratory control. Each step is checked so that the final effluent leaving the plant has the desired characteristics. The laboratory maintains a small aquarium in which goldfish are maintained in a mixture of city water and treated waste water proportioned so that the dilution conditions are more severe than in the stream into which the plants wastes go.

The only remaining wastes to be treated at the plant are the strong acid wastes, coming from the dumping of strong acid cleaning tanks. These are dumped on a schedule so that it is possible to handle them batchwise.

Before describing the equipment used to neutralize this waste, it is interesting to note the method National Carbon uses to prevent strong acid wastes from getting into the regular sewer system. The same method is used for the strong cyanide solutions.

Each tank which contains strong acid or cyanide has no drain. The only way solution can be removed from them is by a siphon. In front of each of these tanks is a floor opening, normally covered with a removable plate. These openings lead into the proper sewer for each tank's contents. The siphon that is provided for the men emptying these tanks is just long enough to reach the drain in front of the tank, and not long enough to reach the drain of an adjacent vessel. Hence, an employee would really have to go out of his way to make a mistake.

The strong acid solutions, hydrochloric, sulphuric, and nitric, flow through their Duriron sewer to a separate treatment building. The flow, which is intermittent, averages some 2,000 gal. per month. Because the flow can be scheduled, however, it is possible to use a single tank for storage as well as for treatment. Here, too, since there are no cyanides present the treatment is simplified—merely caustic addition to neutralize the acids and precipitate metal ions.

NEUTRALIZING EQUIPMENT

The strong acids flow into a 6,000-gal. tile-lined storage tank where they are held and periodically neutralized. Solid caustic is weighed out, after analysis of the acid in the tank, and dissolved in an agitated steel tank. The caustic solution then drops by gravity into the tile acid tank. Agitation is achieved by circulating liquid through a Duriron centrifugal pump. The piping used is hard rubber for corrosion protection. When neutralization has taken place, the solution is allowed to stand to let the hydroxide and oxide sludge settle. The clear water is then aspirated from the top by the same centrifugal pump and sent to the city sewer system. The remaining sludge is pumped into a tank cart and hauled to the dump for final disposal. This sludge averages about 350 cu. ft. per month.

All in all, the waste disposal system developed by National Carbon has some features that will not apply to all plating plants. But in broad outline the method should be valuable to any plant faced with disposal of cyanide solutions.

In conclusion the author wants to acknowledge the assistance and cooperation of V. D. Kleinsmith, plant manager, and particularly his associates C. F. Pearson and Charles Wilson.

FISCHER-TROPSCH YIELDS
. . . alcohols, ketones, acids, esters and other aliphatics.

COAL HYDROGENATION YIELDS
. . . phenol, cresol, xylenol and many other tar acids and bases.

SHALE OIL YIELDS
. . . ammonia, phenol, cresol, pyridine and various other tar bases.

Shale oil and byproduct chemicals are made at this Bureau of Mines unit.

From Synthetic Fuels, What Chemicals!

PETER W. SHERWOOD

Next 12 months will usher in an important new American industry. The first commercial-sized Fischer-Tropsch plant using fluidized-catalyst technique is scheduled to begin operations near Brownsville, Tex., while the Bureau of Mines will take the first American coal hydrogenation plant on stream at Louisiana, Mo. A small but important gas synthesis plant of the Bureau of Mines, using an internal oil-coolant technique is well advanced in construction and significant studies in shale oil distillation are being carried out at Rifle, Colo., and in other locations.

These three important processes open up new sources for the manufacture of liquid fuels. Inseparably connected with each of these processes is the simultaneous production and possible recovery of different groups of important basic chemicals. They will have a big effect on many markets.

Chemicals which can be recovered from shale distillation, high-pressure hydrogenation, and gas synthesis vary as widely as the oils derived from these sources. The processes are complementary and their selection is, in general, governed by raw material, conditions prevailing locally and by the requirements on the product. It is only in certain narrow fields of production that the two synthetic processes are strictly competitive.

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FROM FISCHER-TROPSCH

The Fischer-Tropsch process for the catalytic hydrogenation of carbon monoxide produces substantially straight-chain paraffins and olefins. Some of the hydrocarbon products of higher molecular weight constitute waxes of a unique and probably useful character. Intermediate fractions represent a potentially important intermediate for oxidation to fatty acids and for the synthesis of detergents and plasticizers by the high-pressure reaction with water gas in the presence of a cobalt catalyst (i.e., by the OXO process).

The nature of the product is directly determined by the catalyst and by operating conditions, notably by pressure and temperature. Early industrial experience was concentrated on the use of a cobalt-magnesia-thoria-Kieselguhr catalyst which yielded highly saturated long-chain products. Today's operations relegate this catalyst to chemical production. In liquid fuels synthesis, iron catalysts are used. They yield a more highly olefinic product of lower average molecular weight and higher oxygen content.

Water is a copious secondary product of the Fischer-Tropsch process. Therefore, product condensate is formed in two layers between which the oxygenated organic chemicals are distributed. Bulk of the byproduct chemicals of low molecular weight is found in the aqueous layer. In the present economy these are far more important. Oxygenated chemicals found in the hydrocarbon phase have a higher molecular weight and present more severe recovery problems.

On a percentage basis, the yield of oxygenated chemicals derived from operation with cobalt-base catalysts is small. Koch and co-workers[1] found that fatty acids made up 0.35 percent of total product of standard atmospheric-pressure operation. While this quantity seems small, it does represent an annual production of 2,100,000 lb. in a plant operated at 6,000 bbl. per day primary products. More than eighty percent of the total fatty acids are water-soluble, being mainly acetic acid (about 60 percent of the total) with smaller amounts of propionic and butyric acids.

Synthesis over cobalt catalyst yields small amounts of alcohols. Firsanova[2] reports 0.15-0.37 percent neutral oxygenated compounds in the reaction water. Methyl, ethyl, *n*-propyl, and *n*-butyl alcohols were identified. Acetone and an aldehyde were present.

Alcohols (about 0.6 percent of the total production) were recovered in 70 percent concentration by distillation of the reaction water at Hoesch.

Associated with the alcohols—which were not isolated industrially—were smaller amounts of aldehydes, ketones and esters.

Industrial gas synthesis with cobalt catalysts was practiced at nine German plants. Only one plant (Hoesch) re-

covered chemical byproducts. Fatty acids were extracted from the hot reaction gases and from the diesel oil fraction by alkali washing. The sprung acids had the following approximate composition[4]:

	Percent
C_2–C_5	20
C_6–C_9	20
C_{10}–C_{20}	35
Residue	5

More important for the American economy is the hydrogenation of carbon monoxide in the presence of iron catalysts. The operation is generally carried out at about 400-500 psi.

Elevated pressures favor the production of alcohols and one particular process version—the Synol process[4]—exploits these characteristics of the synthesis reaction for the preferential production of aliphatic alcohols in yields ranging between 30-50 percent. Temperature is the principle variable. It controls the ratio of hydrocarbons to oxygenated chemicals at any given set of catalyst-pressure conditions. A boost in temperature of only 80-100 deg. F. is capable of converting a predominantly chemical synthesis into a process for the almost exclusive production of hydrocarbon fuels.

Alcohol yield with iron catalysts is larger than with cobalt catalysts. A series of tests of different iron catalysts, operated for preferential hydrocarbon formation, yielded lower alcohols in amounts ranging between 4 and 11 percent of the total liquid products.[5] Acid formation tends to be low and the substantially complete absence of formic acid has been reported,[6] a fact which influences the choice of construction materials significantly.

Weinrotter[7] investigated the water-soluble compounds obtained by the medium-pressure synthesis with hydrogen-rich starting gas in the presence of iron catalysts. The presence of ketones (acetone and methyl ethyl ketone) in small amounts was established qualitatively but aldehydes were found to be completely absent. Water-soluble alcohols were present in the following distribution:

	Percent
Methanol	10.7
Ethanol	57
n-Propanol	23.2
n-Butanol	9.1
Total	100

The amount of fatty acids formed at these reaction conditions is small and amounts to only about 4-5 percent of the alcohol weight. Acetic acid predominates.

Actual operating details of the gas synthesis process of Hydrocarbon Research, Inc., (which employs an iron catalyst) have not been released. However, the expected production of oxygenated byproducts is remarkable for the high aldehyde yield which is essentially lacking in operation with a large number of iron catalysts on which data have so far become available. According to Sullivan,[8] the 6,000-bbl.-per-day plant at Brownsville, Tex., which employs this process, will yield byproduct chemicals in the following annual amounts:

	Estimated Production, Lb. per Yr.
Acetaldehyde	9,100,000
Propionaldehyde	1,930,000
n-Butyraldehyde	2,750,000
Acetone	11,200,000
Methanol	730,000
Methyl ethyl ketone	4,780,000
Ethanol	93,680,000
n-Propyl alcohol	14,400,000
n-Butyl alcohol	4,370,000
n-Amyl alcohol	1,060,000
Acetic acid	24,700,000
Propionic acid	8,700,000
Butyric acid	4,200,000
Methyl propyl ketone	600,000
Total	182,200,000

The separation and purification of the water-soluble alcohols and other neutral compounds is by no means a simple proposition and is carried out by a number of direct and azeotropic distillations and solvent extractions.

As the Fischer-Tropsch process gains a firmer foothold on the American industrial scene, interest may develop in the oxygenated products of higher molecular weight. Today their sole alternative source is OXO process.

The recovery of these oil-soluble chemicals poses a number of difficult engineering problems, and has been the subject of a large number of patents. Solvent extraction has attracted particular interest but is unsatisfactory because a properly selective solvent has not become available. Chemical separation appears a more likely solution. It is, for instance, possible to separate hydrocarbon-alcohol mixtures with a boiling point range not exceeding 100 deg. F. by the formation of boric acid esters of the alcohols. The reaction products exhibit a high enough boiling point to permit easy removal of the hydrocarbons by distillation. The alcohols are readily regenerated by hydrolysis of the residual ester. Boric acid is recovered and recycled.

Other schemes involve the addition of calcium chloride to the product mixture. Crystalline and readily filterable addition compounds of calcium chloride and alcohols are stated to be formed under suitable conditions. The complex can be broken up by the addition of warm water.[9] Still another process proposes the preferential adsorption of alcohols on a porous granular gel.

FROM COAL HYDROGENATION

High-pressure hydrogenation begins with a raw material of high molecular weight which is broken down to molecular fragments of the desired size. The product therefore bears a very pronounced imprint of the raw material.

Most chemical byproducts of industrial value can be recovered from the products of the liquid phase. Here incompletely reduced oxygen, nitrogen, and sulphur compounds are recoverable in marketable form. Unextracted chemicals permitted to enter the vapor phase will be completely reduced to hydrocarbons.

Chemicals obtained during high-pressure hydrogenation bear a close resemblance to the products of destructive distillation of the same raw material. Where the feedstock is coal, the products of hydrogenation are therefore highly aromatic oils and the principal recoverable organic chemicals (other than pure hydrocarbons) are tar acids and tar bases.

The chemical products and recovery problems of the hydrogeneration industry are similar to those of the coal-tar industry.

Similarity between products of these two coal-based industries does not extend to the quantitative yields. Indeed, one ton of coal subjected to hydrogenation will yield phenols and tar bases in about ten times the amount which can be obtained by the destructive distillation of the same ton of coal. Associated with these valuable organic chemicals are very significant amounts of ammonia, sulphur, and secondary recoverable products.

Tar acids constitute the largest volume of organic chemicals recoverable from the products of the liquid phase. As a rough rule, one ton of bituminous coal will yield 30 lb. phenol and 70 lb. cresols plus xylenols. Higher tar acids are present in smaller amounts.

Distribution and yield of phenolic compounds depends on the nature of the feedstock.[10]

A large part of the tar acids produced in coal liquefaction are retained by the aqueous phase associated with the condensed oil products. Recovery from these waste waters has been accomplished commercially by extraction methods derived from the coal tar industry. Preferred solvents are tricresyl phosphate and butyl acetate.

Recovery of tar acids from the oil phase produced in the first liquefaction stage is less common. However, it may be expected to play an important part in making coal hydrogenation an economically sound process in the United States. Extraction is possible by means of methanol or by alkaline aqueous solutions. Perhaps the most useful method involves the use of sodium hydroxide solution from

which the phenols can be sprung by means of carbon dioxide. The resulting Na_2CO_3 is reclaimed.

The economic impact of tar acid recovery on high-pressure hydrogenation has been demonstrated by Hirst and coworkers[11] who find that a credit of 5c. per gal. gasoline will accrue from the sale of such byproduct tar acids. One 20,000 bbl. per day bituminous coal hydrogenation plant can be made to yield some 15 million pounds per year tar acids. In 1945 the daily refinery output of the United States was 2.1 million barrels of gasoline; 224 million pounds of tar acids were produced in that year.

Tar bases are present in the products of hydrogenation in smaller quantities. Their commercial recovery is economical only in marginal cases. The bulk of these materials are found in the heavy fractions of the liquefaction oils. This is partly due to formation of addition compounds between tar acids and bases. Thus, pyridine has been reported to be present in concentrations of about 0.012-0.017 percent in the liquid-phase gasoline fraction. The middle oil fraction of the same product contained up to 0.06 percent pyridine.

Secondary organic chemicals which can be recovered economically include acetone, methyl ethyl ketone, and acetonitrile. They are concentrated in the gasoline-range distillate of the primary liquefaction stage. The gasoline fraction obtained from a commercial hydrogenation lignite contained 1.0-2.5 percent acetone and 0.2 percent acetonitrile. Their recovery is possible by aqueous extraction followed by azeotropic distillation.

Most nitrogen and sulphur compounds present in coal are reduced to ammonia and hydrogen sulphide in the course of hydrogenation. The recoverable quantities of sulphur and ammonium sulphate are appreciable and may play an important role in the future economic picture of the United States. Frese[12] estimates that one ton of hydrogenation coal may be expected to give an average yield of 60 lb. sulphuric acid and 30 lb. ammonia. A hydrogenation industry geared to supply all of America's 1949 gasoline demands would be adequate to fill the entire world's ammonia and sulphuric acid needs.

An interesting group of highly condensed aromatic compounds can be recovered in appreciable quantities from the oil sludge formed in the course of coal liquefaction. Foremost among these chemicals are pyrene, coronene, carbazol, and their derivatives. Hydrogenation of 100,000 tons bituminous coal would permit the recovery of 1,400 tons pyrene and 70 tons coronene.

CHEMICALS FROM SHALE OIL

American shale oil resources are about four to five times the petroleum potential of the country. The more important deposits, are in Colorado, Utah and Nevada. They are capable of yielding an average of 35 to 50 gal. oil per ton of shale.

Shale oil distillation in the United States is still in the experimental stage. Its economic outlook, however, is improving constantly as petroleum prices edge upwards and crude supplies decline in relation to the demand. Recovery of chemicals from these marginal oils will strongly influence the economics of shale distillation.

Oxygen, nitrogen and sulphur are the principal secondary elements recovered from shale by distillation. These elements are tied up in compounds of high molecular weight which are broken down to simpler structures in the pyrolysis.

The amount of the various chemical compounds present in the oil depends largely on the raw material and to a secondary extent on the methods of distillation.

Typical ultimate analyses of the kerogen (organic matter) of various American oil shales have been reported by Guthrie[14]:

	Composition by Percent	
	Colorado	Utah
Carbon	78.40	79.65
Hydrogen	10.42	9.65
Oxygen	6.37	5.50
Sulphur	1.20	1.45
Nitrogen	2.58	2.70
Ash	1.03	1.05

Of particular interest are the recoverable nitrogen compounds. Most pyrolized nitrogen is found in the form of ammonia. Ammonium sulphate recovery per gallon of crude shale oil varies on the average between 1 and 1.5 lb.

Nitrogen remaining in the condensed distillate is present in the form of tar bases—pyridine, picoline, lutidines, quinoline and derivatives. Primary and secondary, organic bases, notably ethylamine, and diethylamine are present in small amounts.

Luts[15] reports the following distribution of chemical classes in a crude Estonian shale oil:

	Percent
Tar bases	0.2
Phenols	22.5
Neutral oils	76.0
Acids	1.5
	100.2

While the oxygen in the kerogen is present in phenolic and carboxylic groups in about equal amounts, the bulk of the thermally unstable carboxylic acids are decomposed and organic oxygen compounds in the distillate are primarily phenols. Carbolic acid is usually found in very small quantities but the cresols (especially meta-cresol) are present in appreciable amounts. The phenol content of successively higher-boiling fractions increases and passes through a maximum[13]:

Fraction, deg. C.	Percent Phenols in Fraction	Percent Phenols (on Total Oil Yield)
200-250	8.2	46
250-300	12.4	1.58
300-350	21.6	5.55
350-370	22.8	9.65

Luts estimates that the average molecular weight of the phenolic compounds in the crude distillate is 300. This means that the phenolic nucleus constitutes only about one-third of the stated phenolic compounds. The thermally labile side-chains break off in the course of successive cracking operations and lower phenols are recoverable in appreciable amounts. Unless these materials are extracted and recovered they must be converted to hydrocarbons.

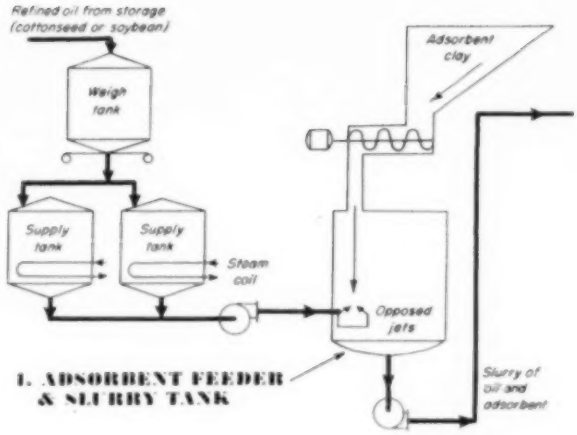
Sulphur compounds recoverable from shale oil are less significant. Less than one-fifth of the total sulphur of the kerogen is found in the crude oil. About one-third is found in the gas as hydrogen sulphide—a potential source for sulphuric acid. The remainder is retained by the solid residue of the distillation process.

A special problem of shale distillation is due to the frequent presence of chlorine in the distillate in quantities up to 0.5 percent.

REFERENCES

1. Koch, H., Pichler, H., and Kölbel, H., *Brennstoff-Chem.*, **16**, 382 (1935).
2. Firsanova, E. N., *J. Appl. Chem. U.S.S.R.* **18**, 367-371 (1945).
3. Hall, C. C., and Craxford, S. R., Additional Information Concerning the Fischer-Tropsch Process and Its Products, BIOS Final Report No. 1722 (1948).
4. Sherwood, P. W., *Oil and Gas Journal*, June 1949.
5. Pichler, H., Synthesis of Hydrocarbons from Carbon Monoxide and Hydrogen, U. S. Bureau of Mines Special Report (1947).
6. Technical Oil Mission Microfilm Reel **101** (1940).
7. Weinrotter, F., Technical Oil Mission Microfilm Reel **101** (1941).
8. Sullivan, F. W., *Chem. Eng. Progress* **43**, 13-17 (1947).
9. I. G. Farbenindustrie, Ger. Pat. Appl. M 147,073 (Feb. 13, 1940).
10. Sherwood, P. W., High Pressure Hydrogenation in Germany, FIAT Final Report No. 952 (May 1947).
11. Hirst, L. L., Skinner, L. C., and Donath, E. E., "Improvements in Coal Hydrogenation," U. S. Bureau of Mines Information Circular 7486 (1948).
12. Sherwood, P. W., High-Pressure Hydrogenation of Carbonaceous Matter, Part 3 to be published.
13. Frese, E., U. S. Bureau of Mines Translation T-219 (1947).
14. Guthrie, R., Studies of Certain Properties of Oil Shale and Shale Oil, U. S. Bureau of Mines Bulletin 415 (1938).
15. Luts, K., Der estländische Brennschiefer, Reval, 1944.

Better Way To Bleach Vegetable Oils



Continuous vacuum process—after eight-year trial run—is now enthroned in big

J. V. HIGHTOWER

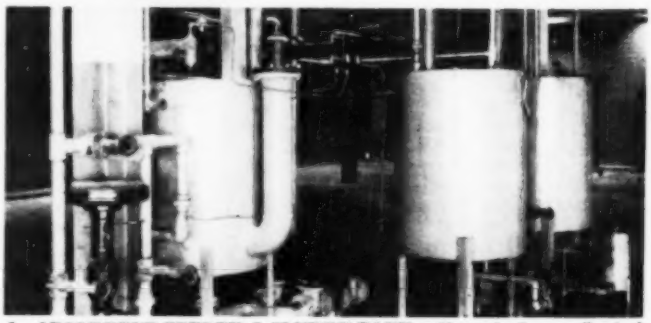
Two continuous, vacuum bleaching units—like the one shown here, and both exactly the same except that one bleaches cottonseed oil and the other soybean oil—were recently put into operation by Mrs. Tucker's Foods, Inc., at Sherman, Tex. The two words "continuous" and "vacuum" make the process different from standard practice; vegetable oils are ordinarily bleached batchwise in open kettles.

Mrs. Tucker's engineers did not lightly break with tradition. To test and develop their new process they set up, back in 1940, a commercial size pioneer unit. They operated it for eight years and found that the advantages of their continuous vacuum system were definite and important: it produced bleached oils of lower color value and greater stability to oxidation and reversion of flavors; it used less adsorbent to get the same color reduction; it prevented rise of free fatty acid during bleaching; it reduced soap content more, thereby also reducing catalyst poisoning in subsequent hydrogenation of the bleached oil; and it improved the flavor stability of the ultimate products, like shortening, margarine and salad oil.

With the pudding so convincingly proved they went ahead in 1948 and built their big new plant. Here is how it works.

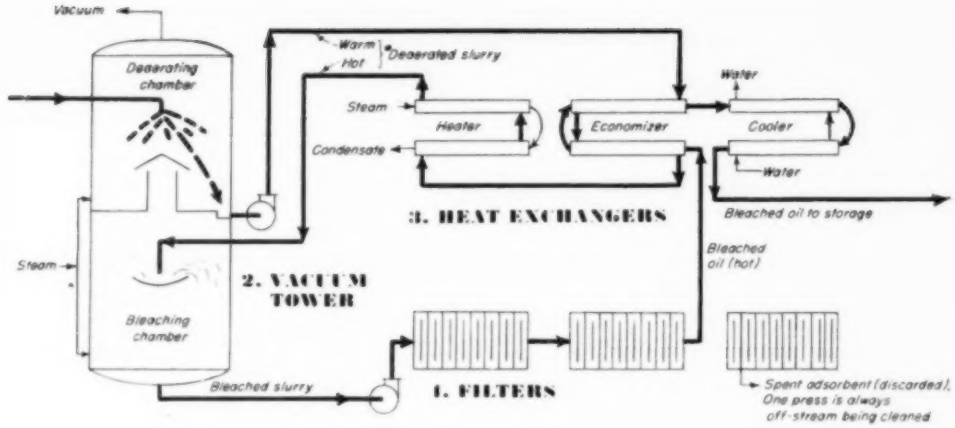
Refined cottonseed or soybean oil from storage is pumped into a scale tank of 140,000 lb. capacity, where it is weighed. A centrifugal pump then moves the oil into one of two refined oil supply tanks. These vessels are 16 ft. high with 14-ft. diameters, each having a capacity of 140,000 lb. Steam coils in the tanks heat the oil to facilitate pumping and to meet the temperature requirement of the oil entering the deaerating and dehydrating chamber. Since the required oil feed temperature averages only 130 deg. F. steam is not kept in the coils constantly.

Next the oil is pumped into a 530 lb. capacity steel slurry tank where it is mixed with adsorbent clay. The clay is dropped into the mix from a duct. It is fed into the duct from an open hopper by a screw type motor-

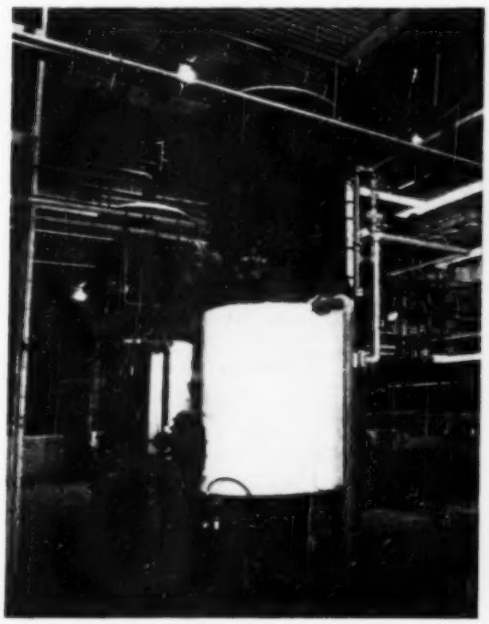


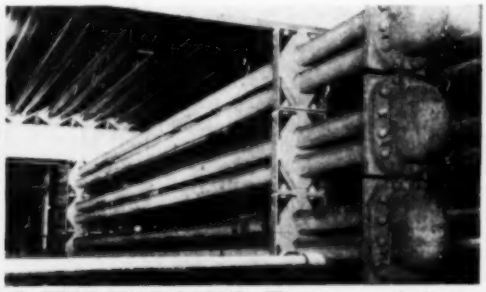
1. ADSORBENT FEEDER & SLURRY TANK. Clay and oil are well mixed when clay falls between two opposed jets of oil (compare photos with flowsheet).

J. V. HIGHTOWER, *now* Chemical Engineering's *West Coast Editor, visited this plant and wrote his article while he was still in Houston as our editor for the Southwest.*

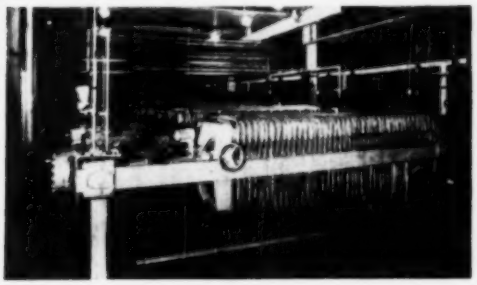


new plant. Expect better economy and better product





3. HEAT EXCHANGERS. They use concentric-pipe type to prevent channeling. Bleaching temperature is about 230 deg. F.



2. VACUUM TOWER. It's two vessels in one. Slurry is deaerated and dehydrated in upper chamber, bleached in lower.

4. FILTERS remove clay from bleached oil. Closed type filter keeps hot oil from being oxidized by exposure to air.

driven conveyor. Delivery rate is controlled by a manual Draver feed which regulates the speed of the conveyor.

Mixing occurs in the slurry tank by entry of the oil through two opposed nozzles. As these streams come into contact, the clay enters their field of play from above, and the resultant turbulence produces an intimate mixture. On the average, the rate of clay input to oil is 0.5 to 1.25 percent by weight of the oil entering. Clay consumption is kept at a minimum because of the cost of the material and of the oil lost in the clay leaving the filter presses. The clay-oil ratio varies appreciably during the course of a run. The run starts with an empty filter press and ends when that press is taken off the system for removal of spent clay. At the start of each run clay is fed into the slurry tank at about 3 percent, but this rate is quickly reduced as clay builds up on the press, where additional bleaching action occurs.

The mixture from the slurry tank passes through a centrifugal pump and is sprayed at 130 deg. F. into the up-

per half of a vacuum tower 12 ft. high and 4.5 ft. in diameter. In the earlier experimental unit the slurry entering this tower was impinged against a baffle plate to produce the dispersion necessary for deaeration; but when they built the new plant they used spray nozzles instead, expecting to get better dispersion. A vacuum of 1.5 to 2 in. Hg abs. is produced in this upper chamber of the tower by a barometric condenser and steam ejector. Here occurs the flashing off of gases dissolved in the oil and adsorbed in the clay, as well as the removal of a certain amount of moisture present in the materials.

As the slurry accumulates in the bottom of the upper chamber it is pumped out and into a concentric-pipe economizer, where it picks up heat from oil that has left the filter presses. Then it passes through a concentric-pipe steam heater, which gets it up to 230 deg. F. Here again the new plant improved on the experimental unit, which did all this heating with a single multi-pass, shell-and-tube, steam-to-oil exchanger. Introduction of the economizer saves steam and cooling water, and the switch from shell-and-tube to concentric-pipe exchangers eliminates possible plugging and channeling.

From the steam heater the hot slurry is sprayed into the bottom half of the vacuum tower. Bleaching occurs here. Also at this point gaseous decomposition products and bound water are released; they pass up through a chimney into the upper chamber and are drawn out through the top of the tower into the vacuum system.

The oil-clay slurry is drawn by centrifugal pump from the bottom of the lower chamber and discharged through two 36-in. aluminum, plate-and-frame, closed filters, connected in series. Here the clay is removed. A third filter is always off the system being cleaned. Filter cake is discarded. Closed filter presses (the experimental plant's were open) were chosen because they prevent air from oxidizing the hot oil. The use of aluminum instead of conventional cast iron also protects oil stability.

After passing through the economizer the bleached oil goes through a water-cooled aftercooler where its temperature is reduced to below 150 deg. F. before storage. It is then ready for processing into finished products or shipment to other manufacturers.

The bleaching units were designed by the Girdler Corp., which is licensed by Mrs. Tucker's Foods to sell and erect installations for the process.

Continuous Vacuum Process Takes Less Adsorbent

Type of Adsorbent	pH of Adsorbent	Type of Oil Bleached	Average % of Adsorbent Used: Atmos.	Average % of Adsorbent Used: Vacuum	Average Color of Bleached Oil: Atmos.	Average Color of Bleached Oil: Vacuum
Natural Clay 1	6.5	Cottonseed	1.27	0.98	2.6	2.4
Natural Clay 1	6.5	Soybean	1.48	1.46	2.4	3.1
Activated Clay 1	3.6	Cottonseed	1.57	1.60	3.0	2.8
Activated Clay 1	3.6	Soybean	1.55	1.40	5.4	5.2
Activated Clay 2	3.2	Cottonseed	1.46	0.90	2.4	2.1
Activated Clay 2	3.2	Soybean	1.32	1.30	2.4	2.5
Activated Clay 2 plus 4 % carbon	....	Soybean	0.92	0.92	3.7	2.5
Activated Clay 1 and 2	....	Soybean	1.011	0.962	4.2	2.5
General Average (14 tests)	....	....	1.37	1.16	3.2	2.9

This table shows that, on the average, the experimental vacuum unit used only 77 percent as much adsorbent as the standard atmospheric process—figured as follows. Look at the bottom line, the general average. It says that in 14 tests (on a total of some 3 million lb. of oil), the atmospheric process used an average of 1.37 lb. of adsorbent to reduce the color of 100 lb. of oil to 3.2 red; while doing strictly comparable work, the vacuum process used less adsorbent, 1.16 lb., to reduce the color of 100 lb. of oil even lower, to 2.9 red. Oil technologists, using certain lab data and their knowledge of their business, can make these numbers more comparable by "interpreting" them to a common denominator: 3.0 red. Thus they can figure that the atmospheric process would have used 1.45 lb. of clay to bleach 100 lb. of oil to 3.0 red, while the vacuum process would have used only 1.12 lb. to bleach the same oil to the same color. And 1.12 is 77 percent of 1.45 which is where the first sentence in this paragraph comes from. Using 23 percent less clay gives the vacuum process two advantages: Less clay has to be bought. And less oil is thrown away with the spent clay from the filter presses (the spent adsorbent contains 25 to 30 percent oil, regardless of the process).

Vacuum Bleaching Improves Flavor

Continuous vacuum bleaching is expected to improve flavor characteristics of the subsequently processed oils. Reasons for this are (1) notable reduction in the oxidation of the oil during bleaching and (2) improved stability of the product to subsequent oxidation. The company is convinced that continuous vacuum bleaching does improve flavor and flavor stability of deodorized oils considerably. This opinion, however, is based more on comparison between the quality of deodorized oils before and after the vacuum system was installed than on results of individual tests.

Vacuum Bleaching Removes More Soap

	Soap Content of Oil, ppm: Atmospheric	Soap Content of Oil, ppm: Vacuum
Refined oil, av.	103	114
Bleached oil		
High	55	20
Low	14	3
Average	32	15

These figures show that vacuum-bleached oils contained on the average, less than half as much soap (15 versus 32), even though they came from refined oils containing somewhat more soap (114 versus 103). The advantage is undoubtedly due to better dehydration of oil and adsorbent; a completely dehydrated soap is insoluble in oil, whereas a hydrated soap seems to be somewhat soluble even in dry oil.

Soap removal is important; soap poisons the nickel catalyst used to hydrogenate bleached oils. Tests showed that vacuum-bleached oils cut catalyst consumption by 25 percent. (Although this benefit is undoubtedly due primarily to soap removal, better oil stability may have helped).

Vacuum-Bleached Oils Are More Stable

Test data showed that the over-all average decrease in oil stability in atmospheric processing was 19 percent (from 13.65 hr. before bleaching to 11.0 hr. after), compared to only 7 percent in vacuum processing (from 13.2 hr. before to 12.25 hr. after bleaching).

Effects of type of adsorbent used in the two processes were also examined. Results are shown in these oil stability reduction figures.

	Stability Reduction During Bleaching, %: Natural Clay (pH 6.5)	Activated Clay 1 (pH 3.6)	Activated Clay 2 (pH 3.2)
Atmospheric	21	15	25
Vacuum	14	4	4

These data show that with vacuum bleaching, the natural clay, least effective in color reduction, also caused the largest reduction in oil stability.

Doesn't Raise Fatty Acid Content as Much

	Fatty Acids in Oils, %: Natural Clay	Activated Clay 1	Activated Clay 2
Atmospheric			
Original	0.070	0.063	0.087
Bleached	0.070	0.073	0.117
Vacuum			
Original	0.065	0.117	0.090
Bleached	0.060	0.113	0.093

Notice here that vacuum bleaching caused no significant rise in fatty acid content, regardless of pH of adsorbent—and notice also that it enjoys a distinct advantage over the atmospheric process in this respect. In theory no free fatty acid increase can occur during bleaching of a completely dry oil with a completely dry adsorbent, because hydrolysis of a soap or neutral oil cannot occur in the absence of moisture. But in practice some moisture is almost invariably present.

NEW OIL-BLEACHING PROCESS PROVES ITSELF IN 8-YR. TEST

These are the test results that sold Mrs. Tucker's Foods on their new continuous, vacuum process for bleaching vegetable oils; they are the reasons the plant described on the preceding page was built. Data on the new vacuum process came from a full scale experimental unit built in 1940. Data on the regular atmospheric, open-kettle process came from parallel operation of standard equipment in the standard manner. Comparison of results showed the vacuum process to have the important advantages itemized above.

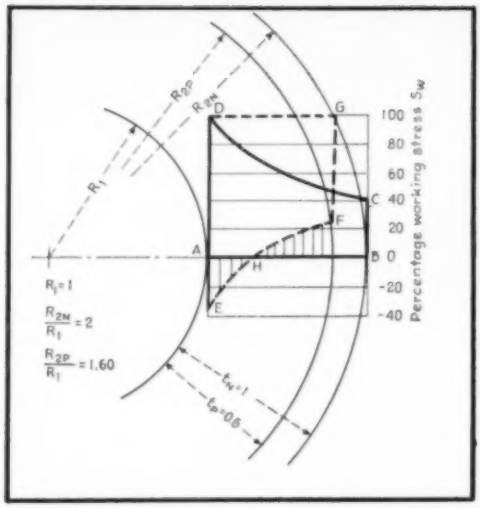


Fig. 1—Comparative stress diagrams for prestressed and non-prestressed construction.

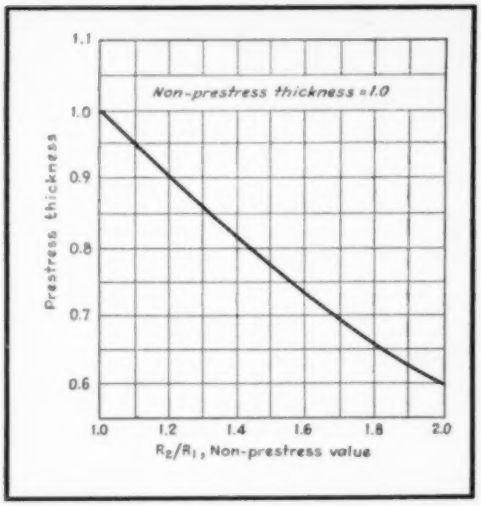


Fig. 2—Comparison of thicknesses for ideal prestressed and non-prestressed constructions.

Design of Prestressed Shells For Pressure Vessels

This is the second of three articles on vessels for high pressure. The first, in August, dealt with monobloc construction. The third, to follow, will discuss practical prestressing methods.

R. R. MACCARY and R. F. FEY

Many chemical processes, within the realm of unusually high pressures of 10,000 psi. and up have not been fully developed on a large production scale because of reluctance of the industry to recognize the feasibility of designing equipment for such processes.

Pressure vessel codes have not as yet incorporated design criteria for this higher range of pressures. Reluctance to include these data may be attributed to unfamiliarity with unconventional forms of pressure vessel construction, and with the special considerations of prestressed shell design.

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With the development of processes demanding pressures exceeding the allowable working stresses of the shell material, it has become increasingly evident that shell design based on conventional practice, as suggested by the direct application of the Lamé formulas,* cannot offer a practical solution since the shell thickness assumes infinite proportions.

To utilize the material provided in the wall of the vessel to better advantage, several methods of construction have been developed which involve setting up an initial stress in the shell.

An investigation of the stress distribution, as represented by the Lamé equation within the elastic range of the material, reveals that the tensile stresses in a thick cylinder due to internal pressure are larger on the inside than on the outside of the cylinder. Fig. 1 shows a stress diagram (Area A-B-C-D) for a non-prestressed solid wall construction, based on the Lamé equation.

Referring to the same figure, the stress diagram for the ideally prestressed design is indicated by Area D-E-F-G. It should be noted that the line D-G of this stress diagram indicates a uniform stress throughout the thickness of the cylinder wall, at the design pressure.

An ideally prestressed thick-walled cylindrical vessel may, therefore, be defined as possessing that condition of prestress which produces a uniform design stress at the design pressure throughout the entire thickness of the wall of the cylinder.

It is desirable to understand the relationships that exist between the non-prestressed and prestressed construction and the applicable formulas

* See the first article of this series, p. 124, Aug. 1949.

which may be used in designing vessels built in accordance with accurately controlled prestressing.

From Fig. 1 the stress diagram for a non-prestressed vessel will have the following tangential stresses on the inside and outside, as given by the Lamé equations:

$$S_i = P_i \left(\frac{K^2 + 1}{K^2 - 1} \right) \qquad (1)$$

and

$$S_o = 2\,P_i \left(\frac{1}{K^2 - 1} \right)$$

where $K = R_o/R_i$.

Also, the stress at any point in the wall of the vessel can be expressed as a function of the radius x:

$$S_x = \frac{P_i R_i^2}{R_o^2 - R_i^2} \left(\frac{R_o^2}{x^2} + 1 \right)$$

The area A of the stress diagram A-B-C-D can then be determined by integrating the above equation between the limits of R_i and R_o, or

$$A = \int_{R_i}^{R_o} S_x\,dx = \frac{P_i R_i^2}{R_o^2 - R_i^2} \int_{R_i}^{R_o} R_o^2 \frac{dx}{x^2} + dx = P_i R_i$$

But Area A-B-C-D can also be expressed as the product of the average stress S_{av} and the thickness, which follows from inspection of Fig. 1. Hence,

$$A = S_{av}\,t = P_i R_i$$

and

$$t = P_i R_i / S_{av} \qquad (2)$$

This relation denotes clearly that if the average stress for a thick-walled vessel can be determined, the thickness t can be computed from Eq. (2) instead of Lamé Eq. (1).

For ideal prestress, the stress distribution for a prestressed construction requires that the curve E-H-F follow the relationship expressed by the Lamé equations. In addition, for ideal prestress construction, the average stress S_{av} is equal to the inside stress S_i as shown in Fig. 1, or

$$S_{av} = S_i = P_i \left(\frac{K^2 + 1}{K^2 - 1} \right)$$

For the relationship developed for the non-prestressed construction the average stress S_{av} is

$$S_{av} = \frac{P_i R_i}{t} = P_i \left(\frac{1}{K - 1} \right)$$

and the ratio of the average stresses becomes:

$$\frac{\text{Prestress } S_{av}}{\text{Non-prestress } S_{av}} = \frac{K^2 + 1}{K + 1}$$

for the same pressure and thickness, from which the relation of thicknesses is seen to be $(K^2 + 1)/(K + 1)$ for non-prestressed to prestressed construction, for the same working stress and pressure.

It may, therefore, be concluded that with prestressing the thickness can be reduced from the non-prestressed design by this ratio, or

$$t_{\text{pre-stress}} = t_{\text{non-pre-stress}} \times \left(\frac{K + 1}{K^2 + 1} \right)$$

where $K = R_o/R_i$ based on non-prestress construction. This is graphically indicated in Fig. 2 for various ratios of R_o/R_i.

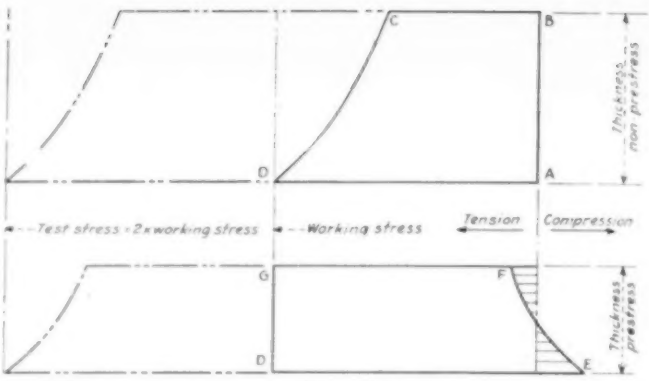

Fig. 3—Comparative stress patterns under working and test pressures.

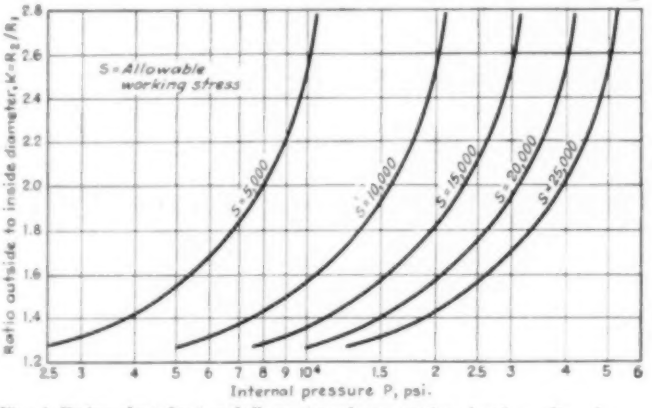
S = Allowable working stress
S = 5,000
S = 10,000
S = 15,000
S = 20,000
S = 25,000
Ratio outside to inside diameter, K = R2/R1
Internal pressure P, psi.

Fig. 4—Design chart for two-shell pre-stressed construction, based on Eq. (9).

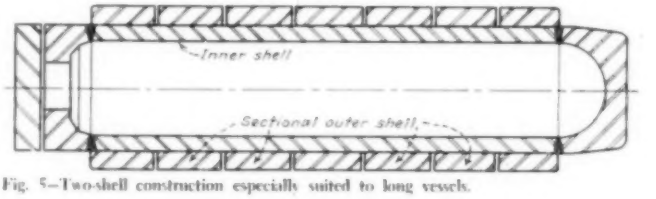

Fig. 5—Two-shell construction especially suited to long vessels.

In designing for ideal prestressed construction, the total thickness must first be determined for the conditions of pressure and properties of the materials of construction. The design stress S_a of the ideal prestressed construction is equal to the average stress S_{av} as indicated in Fig. 1. Therefore,

$$S_a = S_{av} = P_i R_i / t \qquad (3)$$

and

$$t = P_i R_i / S_a$$

With the thickness determined, the required prestress throughout the wall

thickness must be ascertained. The values of these stresses may be computed as follows:

$$S_c = S_w - \frac{P_1}{t} \times \frac{R_i^2 + R_e^2}{R_i + R_e} \quad \text{(compression)}$$

$$S_c = S_w - \frac{2\,P_1}{t} \times \frac{R_i^2}{R_i + R_e} \quad \text{(tension)}$$

The required prestress at any intermediate radius is,

$$S_c = S_w - \left[\frac{P_1 R_i^2}{R_e^2 - R_i^2} \left(\frac{R_e^2}{x^2} + 1 \right) \right]$$

The uniform design stress distribution attained by prestressing is valid only for the operating pressure and temperature considered in the design. Reasonable variations, however, will not materially affect the safety of the vessel in operation.

Fig. 3. indicates the stress pattern during testing for both the non-prestressed and prestressed construction. To produce a test stress of twice the design stress on the inside of the shell the test pressure for non-prestressed construction must be:

$$P_T = P_w \left(1 + \frac{K^2 + 1}{K^2 - 1} \right) \qquad (4)$$

and for prestressed construction:

$$P_T = P_w \left(1 + \frac{K^2 - 1}{K^2 + 1} \right) \qquad (5)$$

Testing to pressures which would stress the material into the plastic range will tend to nullify the advantages gained.

It is felt that an understanding of the ideal prestress condition as covered by this article is necessary to understand and apply the design criteria for various practical methods of prestressed construction.

MULTI-SHELL CONSTRUCTION

One method which has found application in approaching the ideal prestressed shell is multi-shell construction, where the cylinder is built up of two or more concentric shells, each shell progressively shrunk on from the inside outward. As a result, the inner shells are subjected to an initial compressive tangential stress so that when the internal pressure is applied, the tensile tangential stress in any shell layer does not exceed the allowable safe working stress.

Shells built up of a few cylinders by the shrinkage method are best adapted for use at very high internal pressures. The cylinders must be accurately machined to insure uniform shrinkage pressures necessary for prestressed construction. The stresses set up by shrinkage due to external pressure on the inner cylinder and an internal pressure on the outer cylinder must not exceed the elastic limit of the material of the shell. In any case, the resultant stress, when the internal pressure of the vessel is applied, should reach the maximum allowable working stress for a most favorable design. The magnitude of the shrinkage stresses is determined by the initial difference between the bore of the outer and the external diameter of the inner cylinder. The permissible degree of shrinkage involves a consideration of the maximum temperature to which the outer cylinder can conveniently be heated without impairing the properties of the material.

In order to design a built-up cylinder, it is necessary to select the number of shells desired in the construction, and calculate the radii and shrinkage for each shell shrunk on. General formulas for direct application to the design of built-up cylinders have been developed by Cox,* and are based on the relationship established by the Lamé equation for stresses in thick-walled cylinders.

From economical and fabrication considerations, the number of shells should be held to a minimum. Generally, the application of more than two shells renders the cost of manufacture too high, nullifying the advantage of prestressed construction.

Considering a cylinder built up of n shells, with the successive inside diameters of each shell given by D_i, D_0, . . . D_n, the smallest value of tangential stress S, is obtained when the ratio of the external and internal diameter is constant for each shell. Such a condition obtains when the geometric mean of internal and external diameters forms the diameter of the intershell surface between any two shell, or

$$\frac{D_i}{D_i} = \frac{D_0}{D_i} = \frac{D_1}{D_0} = \cdots = \frac{D_n}{D_{n-1}}$$

Under such proportions of design, the difference in diameters for a two-shell construction, that is, the excess of the outside diameter of the inner shell over the inside diameter of the outer shell to be shrunk on is

$$\Delta D_i = P_i \frac{D_i}{E} \left(\frac{2\,K^2}{3\,K^2 + 1} \right) \qquad (6)$$

and the stress set up on the inside of each shell for the combined effect of shrinkage stress and tangential stress due to internal working pressure is

$$S_t = P_i \left[\frac{(1 + K^2)^2}{4\,K^2} - 1 \right] \qquad (7)$$

where D_i = inside diameter of the inner shell, inches; P_i = internal pressure; D_1 = interface shell diameter; D_e = outside diameter of outer shell; E = modulus of elasticity, psi.; K = ratio of outside and inside diameters of the shells; and $D_1 = \sqrt{D_e D_i}$.

These formulas may be used as the basis of design for a built-up cylinder of two shells with an allowable working stress $S_w = S_t$. The tangential stress set up at the internal boundary of each shell is selected as the governing stress, while the radial stress is considered negligible.

TWO-SHELL DESIGN

The proportions of the two cylinders may be ascertained from the value of K which will satisfy the above equations, bearing in mind that the diametral enlargement of the outer cylinder by heating is given by

$$\Delta D_i = \alpha\,(\Delta T)\,D_i \qquad (8)$$

where α is the mean coefficient of expansion and ΔT is the temperature difference between the heated cylinder and the ambient temperature during the shrinkage operation.

To satisfy both Eqs. (6) and (8) with one value of K, a fixed relation between allowable shrinkage and allowable working stress is necessary, but not always feasible in design. Since stress considerations will generally govern, it is preferable to determine the value of K from Eq. (7) first, and then compute the required shrinkage from Eq. (6).

Eq. (7) may now be rewritten in simple form to solve for values of K, as shown graphically for design purposes in Fig. 4.

$$K = \sqrt{c/(2 - c)} \qquad (9)$$

where $c = \sqrt{(P_i/S_w) + 1}$. Then the proportions of the two cylinders become $D_i = KD_i$ and $D_e = KD_i$.

A review of these equations with the Lamé equation for monobloc cylinders indicates that the built-up construction possesses an economic advantage of a smaller over-all outside diameter of shell for a given condition, when the internal pressure exceeds approximately one-half the allowable working stress. Below this value, the reduction in outside diameter of shell is insignificant and uneconomical in construction. However, Eq. (9) also reveals that, for a pressure approaching a value of three times the working stress, the proportions of the cylinders become infinite. Such construction is, therefore, limited to designs within the range of pressures from one-half to twice the value of the working stress, for an economical and efficient unit.

(Continued on page 111)

* Cox, H. L., Design of Built-Up Cylinders, *Engineer*, 162, 179, 180, Aug. 21, 1936.

	1960		1946	
	Estimated Northwest Production, Thousand Tons		Estimated or Actual Northwest Production	
	Min.	Max.	Thousand Tons	% of All U. S.
Phosphate rock mined	1,334	2,258	641	7.95
Phosphorus	101	187	.....	.....
Phosphoric acid	400	625	63	7.35
Phosphates	30	40	.....	.....
Triple superphosphate	350	530	60	18.62
Ordinary superphosphate	135	225	100	1.27
Sulphuric acid	226	380	60	0.70
Calcium carbide	70	140	27	4.74
Acetylene (million cu. ft.)	290	650	50	1.03
Acetic acid	4	15	1	0.86
Chlorine	85	122	40	3.43
Caustic soda	109	158	46	2.46
Chlorates and perchlorates	4.6	7	4.5	20.45
Carbon bisulphide	25	27	.....	.....
Rayon	67.5	87.5	.....	.....
Wood pulp	1,635	2,544	1,740	16.4
Cement	1,500	1,700	927	3.01
Artificial abrasives	18	32	.....	.....
Aluminum, primary	1,300	1,800	148	36.10
Magnesium, primary	6	25	.....	.....
Zinc, primary slab	265	340	212[2]	27.77
Lead, primary refined	130	180	70	20.70
Copper, primary refined	125	175	75	9.54
Antimony, primary	3	5	2.4	13.57
Electrolytic iron	5.4	36	0.9[2]	22.5
Electrolytic manganese	7	15	.....	.....
Rolled steel	400	480	290[2]	0.48
Rolled stainless steel	6	20	.....	.....
Steel castings	40	50	22	1.52
Gray iron castings incl. pipe	150	190	75	0.73
Malleable iron castings	6	8	.....	.....
Ferro-alloys	55	100	30[2]	1.76

[1]1945; [2]1947. Note: in making 1960 estimates it has been assumed that the differential between minimum and maximum represents the range under conditions of moderate employment.

PRODUCTION PREDICTION

By 1960 the "percent" column on the far right should look a lot fatter. Doubled production, or better, is expected of all but six of these items.

PACIFIC NORTHWEST–1960

Given enough power, the Northwest expects to meet these predictions and put itself on the industrial map

IVAN BLOCH

If the table above is anywhere near right the Pacific Northwest is going to be quite a chemical center by 1960. Look at some of the minimum predictions: triple superphosphate to go from 60,000 tons in 1946 to 350,000 tons in 1960; that is a hike of 580 percent. Aluminum to jump from 148,000 tons to 1,300,000, up 780 percent; sulphuric acid up 380 percent; acetylene up 580 percent. And these are minimum predictions.

Such expansion seems fantastic, but it's all in the cards according to a report issued last October by the Army Engineers. (EDITOR'S NOTE: "Review Report on Columbia River and Tributaries," a many-volumed work released only for technical review and prepared to justify further hydroelectric development of the Columbia basin. Its industrial sections were compiled for the Army by a group of technicians and economists under the author's direction while he was with Bonneville. For two years, 1945-1947, they studied the industrial potential of Washington, Oregon, Idaho and western Montana. Their forecasts are based on three assumptions: that full employment and full production continue, that no major depressions or wars intervene; that power development is not allowed to lag industrial demand. Incidentally, power shortage has already turned away some would-be manufacturers during the two years since the report was written.)

Here is what the report has to say about the future of the chemical process industries in the Northwest, together with some comments on developments since the report was written. These are the highlights.

ALUMINUM. The report's almost unbelievable estimate for 1960 aluminum production, 1.3-1.8 million tons, is based on a thorough analysis of potential U.S. markets (see ALUMINUM table, right). Most of the potential market was allocated to the Northwest, on the assumption that adequate power resources will not likely be developed anywhere else.

To match this aluminum reduction capacity the Northwest could use an annual 1.9-2.9 million tons of alumina production. Alumina now comes by rail from southeastern plants at Hurricane Creek, Baton Rouge and East St. Louis. The Northwest could save as much as half the freight bill by building its own alumina capacity, figuring 15 to 25 years to amortize the new plants.

The Northwest has several possible sources of raw material for alumina production: It is feasible to import foreign bauxite. Clays of relatively high alumina content are abundant in Oregon, Washington and Idaho. There are billions of tons of amorthosite in Wyoming along the Union Pacific Railroad. And perhaps most interesting of all, there are the now

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well-known laterites (ferruginous bauxites) of northwest Oregon and southwest Washington. These deposits are estimated at 10 to 20 million tons averaging 31 percent alumina, 23 percent iron and 11 percent silica. For the past four years Alcoa has been working on the laterites: exploring, blocking ore and ostensibly making metallurgical and chemical tests.

There appear to be at least two ways to process laterite ores: (1) a modified Pederson process where ore is smelted in electric furnaces to a high silica pig iron and a calcium aluminate slag; the slag could then be treated by lime-soda-sinter process prior to utilization in a Bayer plant; (2) treatment of the ores as "red mud" involving lime-soda-sinter processing prior to Bayer processing, with high iron and silica residues providing a possible source of iron for a Northwest iron industry. As to clays, the experimental ammonium sulphate process plant at Salem, Ore., apparently demonstrated that alumina could be made from Northwest clays, but as far as the experiment was carried, costs were not competitive with bauxite.

Production of these enormous quantities of alumina from bauxite or laterite would require enormous quantities of chemicals like sodium hydroxide, sodium carbonate—and pure calcium oxide; three or four years ago Alcoa started extensive exploration of some extremely pure limestone a barge-haul away in southeastern Alaska.

MAGNESIUM. The future for Northwest magnesium doesn't look as rosy as for aluminum. Compared with Dow's Gulf Coast plant, a seawater electrolytic plant in the Northwest would pay more for fuel and raw materials (like limestone, chlorine or salt, sulphur). On the other hand, electric power and other operating expenses would be less. The report concludes that 1960 might find a modest 6-25 thousand ton annual production in the Northwest—if, as the report expects, the 1960 market for magnesium reaches the peak wartime demand.

PHOSPHORUS INDUSTRY. Sixty percent of U. S. phosphate rock reserves lie in a belt in southeastern Idaho, western Wyoming, northern Utah and parts of Montana. Yet in 1946 only 8 percent of our mined rock came from there. Two things account for this neglect. First, the extent of western reserves is not altogether known, though estimated at 8 billion tons of better than 40 per-

PHOSPHATES—1960

. . . power demand and phosphorus production

Electric Furnace Production of Phosphorus in Northwest

Consuming Industry	Estimated 1960 Production, Net Tons Min.	Max.
Phosphoric acid	800	1,600
Phosphates	15,000	45,000
Phosphate fertiliser	85,000	140,000
Total	100,800	186,600

Power Consumption by Phosphate Industry in Northwest

Consuming Industry	Estimated 1960 Kilowatt Demand Min.	Max.
Phosphate rock mining		
Phosphoric acid	*	*
Phosphates	1,000	2,000
Phosphate fertiliser	8,000	13,000
Electric furnace operation		
Phosphoric acid	1,500	3,000
Phosphates	24,000	73,000
Phosphate fertiliser	140,000	230,000
Other operations		
Phosphoric acid	*	*
Phosphates	1,000	2,000
Phosphate fertiliser	19,400	32,800
Total	194,900	355,800

* Small amount is included in electric furnace operations.

CHLORINE—1960

. . . markets accessible to Pacific Northwest producers

Use	Estimated 1960 Demand, Thousand Tons Min.	Max.
Pulp bleaching		
Pacific Northwest	45	60
British Columbia	15	20
Alaska	2	5
Chlorinated solvents, other chemicals	20	30
Water treatment, sanitation	2	5
Liquid bleach	1	2
Total	85	122

SULPHURIC ACID—1960

. . . markets in Northwest, exclusive of Utah and southern Idaho

For Use in Production of:	Estimated 1960 Demand, Thousand Tons, 100% Basis Min.	Max.
Superphosphate		
Northern Idaho	12	28
Western Montana	50	57
Along Pacific Northwest Coast	12	24
Ammonium sulphate fertilizer at Salem	...	61
Rayon at Tidewater	100	124
Sugar refining	...	7
Alcohol from wood waste	5	8
Chlorine and caustic soda	2	3
Aluminum sulphate	11	14
Explosives	12	15
Others	22	39
Total	226	380

RAYON—1960

. . . annual production of viscose and acetate in Pacific Northwest

	Estimated 196 Production, Million Lb. Min.	Max.
Eugene, Ore. (viscose)	45	50
Longview, Wash. (viscose)	45	50
Puget Sound Area, Wash. (viscose)	45	50
Willamette Valley, Ore. (acetate)	...	25
Total	135	175

PORTLAND CEMENT—1960

. . . annual production rates by area in the Pacific Northwest

	Estimated 1960 Production, Thousand Bbl. Min.	Max.
Southwestern Oregon	680	750
Northeastern Oregon	375	450
Lower Columbia River Area	790	840
Eastern Washington	1,400	1,470
Puget Sound Area	4,550	5,130
Southern Idaho	340	380
Total	8,135	9,000

CALCIUM CARBIDE—1960

. . . markets accessible to Pacific Northwest producers

Use	Estimated 1960 Demand, Thousand Tons Min.	Max.
Synthetic chemicals		
Pacific Northwest	18	50
California	...	25
Cutting and welding metals		
Bottled acetylene, Pacific Northwest	9	11
Shop-generated acetylene, Pacific Northwest	7	10
Bottled and shop-generated acetylene, other western states	32	39
Exports	4	5
Total	70	140

ALUMINUM—1960

. . . outlook for feasible markets in the United States

	Estimated 1960 Aluminum Requirements, Million Lb. Min.	Max.
Building products	350	700
Automobiles	285	1,380
Displacement of copper, mostly in wire and cable*	250	450
Trucks	211	968
Buses	40	56
Railroad cars	51	88
Aircraft	51	109
Displacement of zinc die castings*	34	52
All other uses	2,500	2,500
Total	3,772	6,303

* There is some duplication of figures representing displacement of copper and zinc because of the use of these metals in automobiles trucks and buses for which aluminum estimates were made without an analysis of metals displaced.

cent tricalcium phosphate. And second, the industry and its thinking are focused on eastern markets and eastern deposits; the "distant" west is somewhat *terra incognita*.

The picture is clearing though. Soil nutrient deficiencies of the 17 western states were studied and estimated at about 500,000 tons a year of P_2O_5. With which western phosphates began to look more interesting to the fertilizer companies. To meet the interest, the Interior Department has for three years been promoting geological exploration, mining development work, research on rock beneficiation, investigation of markets and freight rates, and the revision of certain laws relating to public domain on which most of the western reserves are located. As a result new plants have been established or are being built and many more are in the wind. The report predicts tremendous expansion (see big table and small PHOSPHATES table).

The report goes into detail on phosphate cost factors. Mining costs would be about the same as in Tennessee, somewhat higher than Florida. Some areas might be strip-mined but most would have to be underground. High-grade rock lies in veins 4-7 ft. thick and ranges from 30 to 34 percent P_2O_5, or 65 to 80 percent tricalcium phosphate. In these, the rock usually contains less than 2 percent iron and aluminum combined; it contains less silica than Florida rock. Some of the lower grade rocks (30-50 percent tricalcium phosphate) are 75 to 100 ft. thick. In certain locations the rock contains vanadium fractions, as V_2O_5, ranging from 0.1 to 0.5 percent. Experimental work by federal agencies seems to indicate the need for nodulizing prior to charging in the electric furnace. On the other hand, recovery of vanadium fractions may yield juicy byproduct credits.

Estimators vary on the cost of producing elemental, electric furnace phosphorus in the western phosphate area. The report figures $140 a ton, based on 1946 costs and assuming 3 mils per kwh. for power. Coke costs to a western plant would be somewhat higher than to one in Tennessee; silica rock or gravel (for fluxing) would be about the same; 3 mil power, if it gets down to the phosphate area, would be under Tennessee and much less than Florida.

Phosphoric acid, the report says, could be made in the West by the combustion of elemental phosphorus for $39 a ton for 75-percent acid, or $26 a ton for 50-percent acid.

Triple superphosphate (48 percent available P_2O_5) could be made by electric furnace methods for $31 a ton in bulk, $34.50 bagged (which amounts to $64.50 and $72 per ton of equivalent P_2O_5). Into these costs the report has figured plant investment, labor, power, raw materials and all other costs except selling and distribution. There is little future for production of ordinary superphosphate or sulphuric acid methods; the long haul from the Northwest to consuming markets precludes all but highly concentrated products. Best bet, says the report, is elemental phosphorus, shipped by tank car to consuming areas and there converted to phosphoric acid and on to fertilizer.

Some angles of the fertilizer story weren't hit by the report: There is a good chance that ammonia production, based on Wyoming natural gas, will come to pass in the near future. Production of concentrated fertilizer by the wet process may come if they recover sulphur from this same Wyoming gas.

SULPHURIC ACID. In 1945, according to the report, the Northwest's two sulphuric acid plants—one at Anaconda, Mont., the other at Du Pont, Wash.—contributed less than 1 percent to the national total (see big table). A growing Northwest chemical industry will push the demand up considerably (see SULPHURIC ACID table) and some expansion has already started. American Smelting and Refining is building an acid plant to recover smelter gas at Tacoma, and Kennecott Copper is expanding its acid plant at Garfield, Utah. Wyoming's natural gas is being developed as a local source of sulphur. Stanolind recovers some 75 tons a day from its unitized gasoline operation at Powell, and Texas Gulf Sulphur is reportedly getting set at Worland to produce 300 tons a day by 1950. Up to now the west has had to rely on imported Gulf sulphur or on smelter gas.

CALCIUM CARBIDE. Analyzing the markets for calcium carbide, the report finds that over 60 percent of the acetylene made from calcium carbide in the U.S. in recent years has been used to make synthetic chemicals; in the West the bulk goes for cutting and welding metals. There's no reason, as the report sees it, why the West cannot get into the acetylene chemicals act—and push its carbide production up to 70-140 thousand tons a year in or around 1960 (see small CALCIUM CARBIDE table).

Northwest carbide producers — there are two of them, in Portland— pay more for raw materials than other areas; but on the plus side of the ledger are an important saving on power and, quite recently, discovery of chemical grade limestone near Baker, Ore. Looking at potential markets for acetylene, the report sees promise for the production of acetic acid and anhydride—these for the rayon industry that could take root in the Northwest's cellulose resources.

RAYON. At present the Northwest sends dissolving wood pulp to the East and brings back finished rayon products. The report thinks the West could now support its own rayon industry: population is growing by leaps and bounds; Los Angeles is the nation's second largest tire producing center; and California's textile industry is growing rapidly. California's markets and cotton linters would probably bring the rayon producers there, except that California has a water problem. So rayon will presumably go next door to the Northwest, where there is plenty of pure water, plenty of pulp, and plenty of all other raw materials either on hand or potentially available. The report looks for 68,000-88,000 tons a year from the Northwest by 1960 or so; it even names possible plant locations (see RAYON table).

CARBON BISULPHIDE. If rayon does go to the Northwest, it will almost certainly create local carbon bisulphide production—around 25,000 tons a year, says the report. (And carbon tetrachloride, dyes, solvents and insecticides might easily follow carbon bisulphide.) Wood waste for charcoal will be an important asset to Northwest bisulphide producers.

CHLORINE & CAUSTIC. These are already well established in the Northwest; two plants were built at Tacoma in 1928 and a third went up during the war at Portland. Pulp and paper will continue to be the major outlet but there is a good potential in chlorinated solvents, DDT, rayon and chlorates (see CHLORINE table). In fact, since the report was written, DDT production started in the Northwest.

CEMENTS. The report's estimated increase in cement production, 60 to 80 percent over 1946, is probably over conservative (see PORTLAND CEMENT table). Numerous big new dams will require large quantities of cement, and so will settlement of some 800,000 acres of new irrigated land in the Columbia Basin project in Washington. To meet these demands by dams and population, cement capacity in

the Northwest should be increased from 8.5 million barrels at present to nearly 11 million barrels a year by 1950, according to a recent estimate by a Portland consulting engineer (K. E. Hamblen, before the annual AIME meeting in San Francisco, February 1949).

Two factors may play a part in this potential increase. One is the possible use of Lepol kilns; they seem to save fuel, and transportation of fuel oil is a heavy production expense in the Northwest. The other factor is the possible use of laterites (ferruginous bauxite) to make quick-setting cements; recent work in the chemical engineering department of the University of Washington makes it look feasible. And the competition in aluminous cement is not stiff; there is only one producer in the United States—which may encourage cement people to try another plant of this type in the Pacific Northwest.

MANGANESE. The report sees a "reasonably favorable" prospect for electrolytic manganese production in the Northwest. Counting chiefly on a growing demand for ferrous and nonferrous manganese alloys it estimates electrolytic production at 7-15 thousand tons a year by 1960.

Since the report was written, however, Manganese Products, Inc., of Seattle, has stirred up interest in the production of manganese oxide by a sulphurous-sulphuric acid leaching process. This company's chemists have turned in good laboratory results; and plans are now afoot to give the process a whirl on a commercial scale at the Salem experimental alumina plant. They would convert the plant for the treatment of stockpiled manganese ores from Nevada and possibly some of the siliceous manganese ores of the Olympic Peninsula in Washington. If the new process pans out, the manganese oxide it produces could spur ferro-manganese production at existing plants and stimulate a variety of important manganese chemicals, for batteries in particular.

ARTIFICIAL ABRASIVES. The report forecasts a sizable installation of abrasives capacity in the Northwest: 8-12 thousand tons a year of silicon carbide and 10-20 thousand of fused alumina. Reasons for this optimism are cheap hydroelectric energy and a rapidly growing market in the metal manufacturing industries. Since the report was written, Carborundum Co. started its big new silicon carbide plant at Vancouver, Wash., and rumor has it that other producers have been exploring around in the Northwest.

Ten years ago, Pacific Northwest basic chemical industries were generally limited to those for the production of chlorine and caustic, synthetic resins, non-ferrous metals, some fertilizer, and a few somewhat isolated products primarily related to agriculture and the forest industries. Since then, enormous strides have been made, largely related to the rapid development of very large sources of low-priced electrical energy from the Federal dams at Bonneville and Grand Coulee on the Columbia River. Today the region produces over one-third of the nation's supply of aluminum; it has expanded its position in the production of copper, lead and zinc; it has three major ferro-alloy plants, two calcium carbide plants, a powdered metal plant, several phosphate fertilizer units, more chlorine and caustic capacity, and many other new plants in both metallic and chemical fields. The region's population has grown by leaps and bounds: Since 1940 it has increased 37 percent as compared with 11 percent for the United States as a whole. Its hydroelectric supplies, once derisively viewed as "economic monstrosities," are now unable to meet growing power demands of industry, home and farm.

In general, the outlook for Pacific Northwest industrial development is decidedly favorable, even though it is to be expected that short-term readjustments will occur in line with national trends. However, the relatively undeveloped status of the region's resources—many of which are unique in their importance to national security and prosperity—provide a foundation for wide expansion of industrial and agricultural production through the establishment of new processing and manufacturing plants. These cannot avoid reflecting the most advanced of techniques, ultimately giving the area a highly competitive structure and a lack of "existing plant obsolescence." The growing consciousness of the area's industrial and business leaders towards research is another factor which bodes well for future development of the magnitude described.

Pressure Vessels

(*Continued from page 107*)

With the proportions of the cylinders established, the required shrinkage may be determined from Eq. (6). During the shrinkage operation, additional diametral clearance is usually required, beyond that established by shrinkage allowance calculation, in order to facilitate fitting the outer shell over the inner shell. Generally, heating to slightly higher temperature will provide the necessary additional clearance for assembly.

In the design of very long vessels, the shrinkage operation may prove cumbersome to handle. In such cases, shells of conveniently shorter length may be slipped over the inner shell, as shown in Fig. 5. The thickness of the inner shell must, of course, be sufficient to carry the longitudinal stresses. The inner shell can be readily checked by the conventional formula for axial stress, which stress should not be greater than the allowable working stress:

$$S_o = P_1 \frac{D_i^2}{D_o^2 - D_i^2}$$

EFFECT OF TEMPERATURE

In many processes where reactions must be controlled at high pressures, the temperature also must be maintained at a considerable number of degrees above the ambient. In such cases, attention is directed to the need of considering the reduced tensile strength, creep, and other changes in the properties of the material, as well as thermal stresses throughout the vessel wall.

To avoid additional stresses resulting from non-uniform temperature distribution in the wall of the vessel caused by marked differences between outside and inside temperatures, insulation both inside and outside the vessel should be used wherever practical. The effect of the insulation should be that of maintaining a uniform temperature throughout the thickness of wall.

Where conditions do not permit the application of insulation, a correction must be applied in the calculations to allow for increased stresses due to thermal effects. These thermal stresses may then be added algebraically to the tensile stresses produced by the internal pressure.

One additional factor which must be considered in the design of built-up cylinders is the method of construction. Where the vessel size permits, forged cylinders may be used advantageously. However, in instances of vessels whose thickness and diameter permits rolling or forming of plates into cylinders, welded construction may be applied.

In the latter construction, welded joint efficiency factors must be employed as generally recommended by pressure vessel codes. In addition, stress relieving of such joints must be performed prior to the shrinkage operation in applying the outer shells, since otherwise the prestress pattern will be altered.

Blower Requirements of Rotary-Drum Vacuum Filters

Filter design problems are simplified in this first of two articles by integrated equations and curves, based on laminar flow; equations also correct for turbulence and pressure

L. E. BROWNELL and G. B. GUDZ

The rotary-drum vacuum filter is the "workhorse" of industrial filtration because of its flexibility in operation, high capacity, and low labor and maintenance costs. A major problem has been the selection of the correct capacity for the vacuum equipment. It is the purpose of this paper to present the necessary relationships in integrated forms so that approximate calculations can be made rapidly.

DEPOSITION OF CAKE

Laminar flow predominates in the formation of filter cakes and the effect of any turbulent flow occurring at the beginning of cake deposition usually can be neglected. The integrated equation for laminar flow is:[5]

$$t = C_L L^2 / \Delta P \qquad (1)$$

where

$$C_L = \frac{\mu_L}{2 K \rho s} \left[\rho' (1 - s) \cdot (1 - x) - \rho s x \right] \qquad (2)$$

DEWATERING

In describing "dewatering," it is necessary to refer to the mechanism of fluid flow. The flow of filtrate and air through the porous cake during two-phase flow depends upon the volumetric proportion of filtrate and air in the voids of the cake. Therefore, the volumetric ratio of filtrate to voids, called the saturation S, is used in describing the proportions of these two phases. It is not possible to remove all the liquid from the cake by fluid flow alone because capillary forces retain a portion of the liquid. This portion is called the residual saturation S_r.

The flow of two phases begins at a saturation of unity. As the cake is depleted of liquid, the flow of air increases from zero to a maximum, and flow of liquid decreases asymptotically to zero as the residual saturation is approached. Some drying results from the passage of air through the cake, but the moisture so removed when using air at room temperature is small enough to be neglected.

During dewatering, some of the filtrate is withheld from flow by capillary forces, and only a portion is flowing. The volumetric ratio of filtrate flowing to total fluids flowing (air plus filtrate flowing) is called the effective saturation S_e and is used in describing the flow of filtrate. The effective saturation S_e is a function of the saturation S and the residual saturation S_r as defined by Eq. (3):

$$S_e = \frac{S - S_r}{1 - 2S_r + S S_r} \qquad (3)$$

Eq. (1) may be used to predict the time for cake deposition, the only assumptions being that the flow is laminar and the cake is non-compressible. The term C_L groups the variables that are constant for a given slurry and that are more or less independent of the operator's control. In general, the term C_L defines the flow characteristics of the slurry and is somewhat similar to the specific resistance used by others.

Experimental values of residual saturation are preferred for making filter calculations; however, the approximation given in Eq. (4) is recommended where experimental data are lacking. This equation is a modification of a similar equation in a previous publication.[2]

$$S_r = 0.025 (N_c)^{-0.284} \qquad (4)$$

where N_c = capillary number = $K \Delta P / g L \gamma$.

The laminar flow of filtrate which nearly always exists at the end of the cake deposition period continues during dewatering. This is true because the properties of the cake, properties of the filtrate or wash, and the pressure gradient are unchanged. The flow pattern of the filtrate remains the same, the air simply substituting for a portion of the filtrate. Thus, the Reynolds number of the filtrate remains constant during dewatering at the value it had at the end of cake deposition, and laminar relationships may be used.

Eq. (5) for laminar flow[5] may be used to predict the relationship between time t and moisture content in terms of effective saturation S_e as follows:

$$t = - \int_{t}^{S_e} \mu_L \times \frac{X L^2 \left[\frac{1 - S_r}{1 - S_r S_e} \right]^2 d S_e}{K \Delta P S_e^2} \qquad (5)$$

In this equation the term $[(1 - S_r)/(1 - S_r S_e)]^2$ is unity when the effective saturation equals unity, and is $(1 - S_r)^2$ when effective saturation equals zero. As this factor is always close to unity, a good approximation may be made by using $[(1 - S_r)^2 + 1]/2$ as an average value so as to permit its removal from under the integral. The equation becomes:

$$t = - \frac{\mu_L X L^2}{K \Delta P} \left[\frac{(1 - S_r)^2 + 1}{2} \right] \times \int_{t}^{S_e} \frac{dS_e}{S_e^2} \qquad (6)$$

Integrating:

$$\frac{t}{C_t} = \left[\frac{(1 - S_r)^2 + 1}{2} \right] \times \frac{(S_e)^{-(y-1)} - 1}{y - 1} \qquad (7)$$

where:

$$C_t = \mu_L X L^2 / K \Delta P \qquad (8)$$

In Eq. (7) the filtration constant C_t is in units of time and defines the variables affecting the flow of filtrate. The exponent y varies with particle size from 2.4 for 20 Tyler mesh to 2.8 for 100 Tyler mesh. Using an average value of 2.5 for the exponent y and parameters of residual saturation S_r, the time ratio t/C_t is plotted

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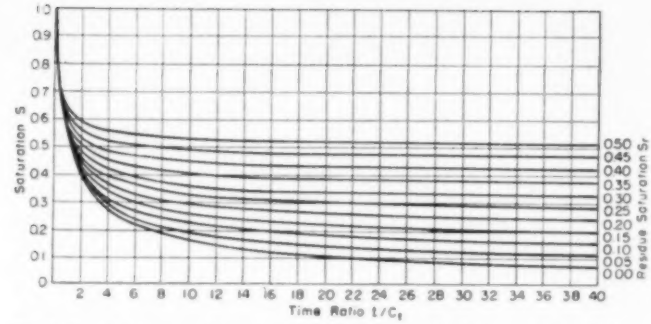


Fig. 1—Dewatering curve (low range) showing the saturation S as a function of the time ratio t/C_t and the residual saturation S_r.

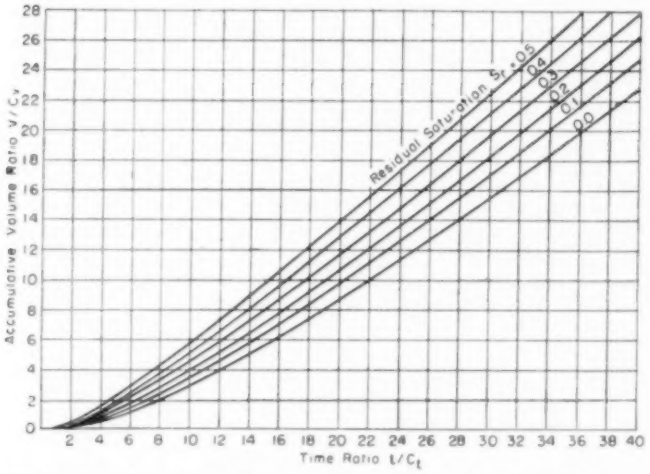


Fig. 2—Integrated air-rate curve showing the air flow V as a function of the filtration constant C_v, time ratio t/C_t and residual saturation S_r.

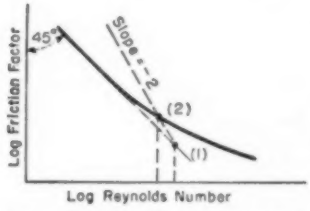


Fig. 3—Rough method of correcting air flow for turbulence, with Reynolds numbers plotted against the friction factor.

against saturation S as shown in Fig. 1. This chart permits rapid determination of the curve of moisture content versus time for moisture removal by fluid flow.

AIR FLOW

As the liquid is removed by fluid flow during the dewatering interval, the air-flow rate increases rapidly from zero to a maximum. The maximum rate is virtually that obtained with a dry cake. Therefore, to predict the blower requirements, the accumulative air flow must be determined by integration of the instantaneous rates of air flow. Since air flow usually is in the early transition region between laminar and turbulent flow, relationships have been derived on the basis of laminar flow with a correction factor for turbulence.

Air rates for single-phase laminar flow may be determined by Eqs. (9) and (10):

$$v_a = K \frac{\Delta P}{L \mu_a} \tag{9}$$

$$= \frac{g_c D^2 X^{n-m}}{32} \frac{\Delta P}{L \mu_a} \tag{10}$$

However, with two-phase flow, the wetted porosity X', defined by Eq. (11), must be substituted for the porosity X in Eq. (10) to predict instantaneous air rate during two-phase flow v_a'.

$$X' = X \left(\frac{1 - S}{1 - S_r} \right) \tag{11}$$

$$v_a' = \frac{g_c D^2 \left[X \left(\frac{1 - S}{1 - S_r} \right) \right]^{n'-m'}}{32} \times \frac{\Delta P}{L \mu_a} \tag{12}$$

The exponent for the wetted condition $(n'\text{-}m')$ rapidly approaches the exponent for single-phase air flow $(n\text{-}m)$. As an approximation, $(n\text{-}m)$ may be substituted for $(n'\text{-}m')$, and Eq. (12) may be divided by Eq. (10) to give Eq. (13).

$$\frac{v_a'}{v_a} = \left(\frac{1 - S}{1 - S_r} \right)^{n-m} \tag{13}$$

Using Eqs. (3), (7) and (13), the air velocity ratio v_a'/v_a was plotted against the time ratio t/C_t over a range of values of saturation S, with parameters of residual saturation S_r. Graphical integration of these curves gave the accumulative air flow V under laminar conditions, since V is the integral of $v_a' dt$, or

$$\int_0^{t/C_t} \left(\frac{v_a'}{v_a} \right) d\,(t/C_t) = \int_0^{t/C_t} \frac{v_a'\, dt}{v_a\, C_t} = \frac{V}{C_v} \tag{14}$$

where

$$C_v = v_a C_t = \frac{K \Delta P}{L \mu_a} \left(\frac{\mu_L X L^2}{K \Delta P} \right) = X L \frac{\mu_L}{\mu_a} \tag{15}$$

In Fig. 2 the curves of the accumulative-volume ratio V/C_v are shown plotted against the time ratio t/C_t, with parameters of residual saturation S_r. In determining these curves, average values of the exponents $(n\text{-}m)$ and y of 4.0 and 2.5, respectively, were used. The value of 4.0 for $(n\text{-}m)$ is an average value for granular and crystalline particles producing cakes having a porosity of about 35 to 40 percent. The use of Fig. 2 permits a rapid determination of the accumulative air flow for conditions of laminar flow.

CORRECTON OF AIR FLOW FOR TURBULENCE

The equations and figures shown so far are based upon conditions of laminar flow. However, if the Reynolds number for the air flow exceeds a value of 100, the flow is no longer purely laminar, and the air flow calculated from these relationships must be corrected for the effect of turbulence.

In making this correction, a Reynolds number first is determined as-

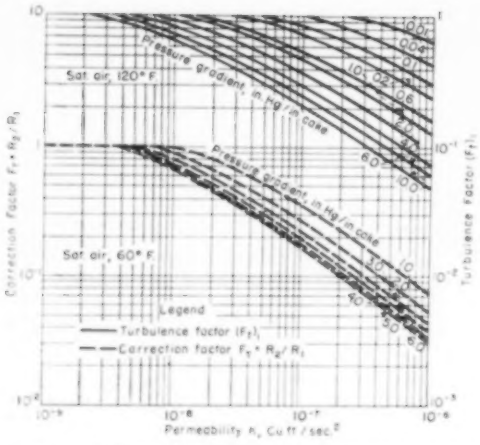

Sat air, 120° F
Pressure gradient, in Hg/in cake
Sat air, 60° F
Pressure gradient, in Hg/in cake
Legend
Turbulence factor (F_T)
Correction factor $F_T * R_2/R_1$
Correction Factor $F_T * R_2/R_1$
Turbulence Factor (F_T)
Permeability K, Cu ft / sec.²

Fig. 4—Turbulence factor and correction factor versus permeability K and pressure gradient $\Delta P/L$.

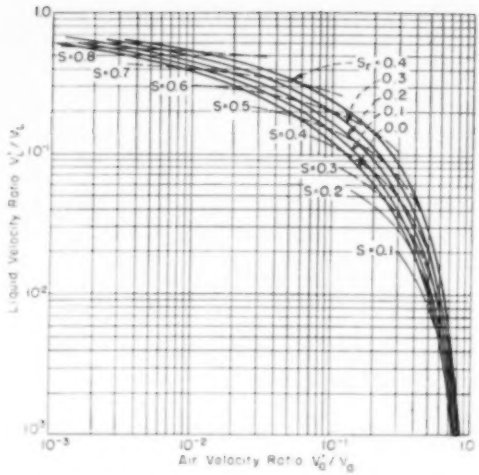


Fig. 5—Washing curve showing relation between air-velocity ratio v_a'/v_a and liquid-velocity ratio v_l'/v_l, for various values of S_r and S.

suming laminar flow, giving Point (1) in Fig. 3. However, the correct Reynolds number is at Point (2), which is the intersection of the transition curve and a line with slope of −2 from Point (1). This is because the correct solution must be on the transition curve and because the locus of points in which velocity is the only variable is a line with slope of −2.

The ratio of the velocity found by assuming laminar flow, to the actual velocity in which there is turbulence, is equal to the ratio of the corresponding Reynolds numbers, termed the correction factor F_r which is given by Eq. (16).

$$F_r = R_2/R_1 \qquad (16)$$

For convenience a plot of this correction factor F_r in terms of permeability K and pressure gradient $\Delta P/L$ is shown in Fig. 4. This figure was constructed using the procedure described above and using average values of 40 percent for porosity X, 8 for exponent n, and 4 for exponent m.

Although the air flow varies widely during the cycle, the Reynolds number for the air remains virtually constant over this range, provided pressure gradient and air properties remain constant. Therefore, a single evaluation of Reynolds number is sufficient to determine the correction to air flow for the entire cycle.

WASHING

During "washing", water or weak liquor is sprayed continuously and uniformly on to the cake and a condition of "steady state" two-phase flow exists. The cake attains a saturation determined by the wash-water rate, properties of the cake and wash, and the pressure gradient. For this saturation, the air-velocity ratio (laminar flow) is expressed by Eq. (13). Similarly, it can be shown that the liquid-velocity ratio v_l'/v_l can be expressed as follows:

$$v_l'/v_l = S_r^2 \qquad (19)$$

Therefore, by selecting a suitable wash rate, the corresponding saturation can be found using Eq. (19), giving in turn, through Eq. (13), the corresponding air rate through the cake during washing. This relation between v_a'/v_a and v_l'/v_l is shown in Fig. 5, with residual saturation S_r as a parameter, and saturation S as a cross-parameter. The accumulative volume of air passing through the cake during washing is equal to v_a' multiplied by washing time. The air rate so determined must be corrected for turbulence as in the case of air flow during dewatering.

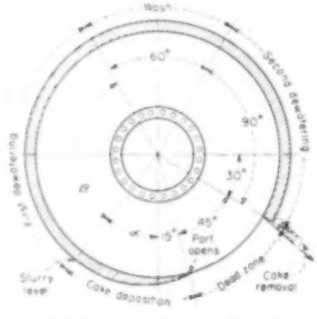


Fig. 6—Filter cycle for example problem.

BLOWER REQUIREMENTS WITH WASHING

During a filter cycle with washing as shown in Fig. 6, the saturation S and instantaneous air rate v_a vary over the cycle as shown in Fig. 7 for the example problem.

The approximate total volume of air V_T to the blower is the summation of V_1, V_2, V_3 and V_4. This total V_T, corrected for turbulence and pressure drop through the filter, multiplied by the drum area of the filter, and divided by the cycle time, gives the blower capacity in cubic feet per minute, or:

$$60\,(V_T F_r F_p A)/t = \text{cfm.} \qquad (20)$$

EXAMPLE CALCULATION

To demonstrate the method of calculation, the blower requirements will be determined for a rotary vacuum filter separating glauber's salt from reclaimed rayon spin bath liquor under the following conditions:

The slurry to be filtered consists of 0.20 lb. of glauber's salt per pound of slurry, or $s = 0.20$. The density ρ of the filtrate is 82 lb. per cu. ft. The density ρ' of the solids in the slurry is 91.4 lb. per cu. ft. The filtrate has a viscosity μ_L of 3.0 c.p. or 0.00202 lb. per sec. ft. The viscosity of the air μ_a equals 0.018 c.p. or 1.21×10^{-5} lb. per sec. ft. The surface tension of the filtrate γ is 4.52×10^{-5} lb. per ft.

The cake has a porosity X estimated at 0.4 vol. voids per vol. cake. The cake's sphericity ψ is estimated at 0.75. The average particle size D (estimated

NOMENCLATURE

A = Drum area of filter, sq. ft.
C_1 = Filtration constant for a given slurry, lb./sec.^{2}/ft.^{4} (See Eq. (2)).
C_2 = Term in Eq. (7) defined by Eq. (8).
C_3 = Term in Eq. (14) defined by Eq. (15).
D = Average particle size, ft.
F_p = Correction factor for pressure = avg. pressure in cake/pressure to blower.
F_t = Correction factor for turbulent flow. See Fig. 4.
g_c = Gravitational conversion factor, 32.17 (lb. mass/lb. force) (ft./sec.^{2}).
K = Permeability, cu. ft./sec.^{2}, defined by Eqs. (9) and (10).
L = Final cake thickness, ft.
$n - m$ = Exponents depending on porosity and sphericity (see Ref. 1).
$n' - m'$ = Exponents depending on wetted porosity and wetted sphericity (see Ref. 2).
N_c = Capillary number = $K \Delta P/g_c L \gamma$
s = Weight fraction of solids in slurry, lb. solid/lb. slurry.
S = Saturation = vol. voids filled with wetting fluid/total vol. voids.
S_e = Effective saturation = voids containing wetting fluid active in flow/voids containing both fluids in flow.
S_r = Residual saturation = maximum volume of wetting fluid eliminated from flow/total vol. voids, defined by Eq. (4).
t = Time, sec.
V = Accumulative volume of air, cu. ft./sq. ft. per cycle.
v_a = Air velocity in single-phase flow, cu. ft./(sq. ft. sec.).
v_a' = Air velocity in two-phase flow, cu. ft./(sq. ft. sec.).
v_l = Velocity of liquid in single-phase flow, cu. ft./(sq. ft. sec.).
v_l' = Velocity of liquid in two-phase flow, cu. ft./(sq. ft. sec.).
X = Porosity, vol. voids/vol. cake.
X' = Wetted porosity, defined by Eq. (11).
γ = Exponent depending on particle size (see Ref. 2).
γ = Surface tension of filtrate, lb./ft.
μ_a = Viscosity of air, lb./sec. ft.
μ_l = Viscosity of filtrate, lb./sec. ft.
ρ = Density of filtrate, lb./cu. ft.
ρ_s = Density of solids, lb./cu. ft.
Ψ = Sphericity of particle, surface area of a sphere having same volume as particle, divided by surface area of particle.

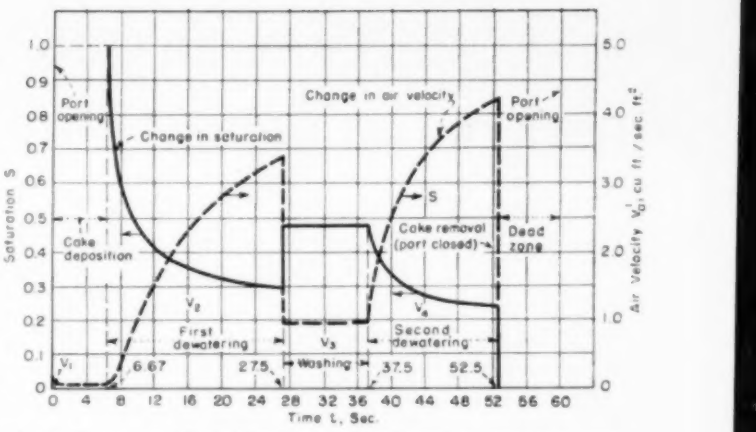


Fig. 7—Change in air velocity during filter cycle, superimposed on change in saturation.

as 35 mesh) is about 0.00136 ft. (See Ref. 1).

Let us say that the filter has an operating vacuum of 4 in. Hg or 283 lb. per sq. ft. The filter drum has a diameter of 4 ft., a width of 2 ft. and a filtering area of 25 sq. ft. The thickness of the cake L is 2 in. or 0.1667 ft. The filter drum we shall assume to rotate at 1 rpm., with variable speed provision. The washing ratio v_l'/v_l is 0.10.

To calculate the filtration constants, $K = 2.16 \times 10^{-7} \times D^2 = 3.94 \times 10^{-8}$ cu. ft. per sec.^{2}. From Eq. (2) $C_1 = 0.002 \times [91.4\ (1\text{-}0.2)\ (1\text{-}0.4) - 82 \times 0.2 \times 0.4] \div (2 \times 3.94 \times 10^{-8} \times 82 \times 0.02)$, or $C_1 = 5.80 \times 10^8$ lb. sec. per ft.^{5} From Eq. (8), $C_2 = (0.002 \times 0.4 \times 0.1667^2)/(3.94 \times 10^{-8} \times 283) = 1.99$ sec. From Eq. (15), $C_3 = 0.4 \times 0.1667 \times 3.0/0.018 = 11.1$ cu. ft. per sq. ft. From Eq. (9), $v_a = (3.94 \times 10^{-8} \times 283)/(0.1667 \times 1.21 \times 10^{-5}) = 5.56$ cu. ft. per (sq. ft. sec.). Similarly, $V_2 = K\Delta P/L v_a = (3.94 \times 10^{-8} \times 283)/(0.1667 \times 0.002) = 0.0335$ cu. ft. per (sq. ft. sec.). Now from Eq. (4), $S_r = 0.025\ [3.94 \times 10^{-8} \times 283/(32.2 \times 0.1667 \times 4.52 \times 10^{-5} \times 1) = 0.19$.

In figuring the cake deposition from Eq. (1), $t_2 = (5.80 \times 10^8 \times 0.1167^2)/283 = 5.67$ sec. Call it 6 sec. The angle α of rotation during cake deposition = 360 deg. $\times$ (6/60) = 15 deg. = 21 deg., or call it 25 deg.

To calculate figures for the first dewatering, $\beta = 150$ deg. $- \alpha = 150 - 25 = 125$ deg. Therefore, $t_3 = 60$ sec. $\times$ (125/360) = 20.8 sec. and $t_3/C_2 = 20.8/1.99 = 10.43$. From Fig. 1 and $S_r = 0.19$, $S_e = 0.28$ (at the end of the first dewatering). From Fig. 2 and $S_r = 0.19$, $V_2/C_1 = 4.0$ and $V_2 = 4.0 \times C_1 = 44.4$ cu. ft. air per sq. ft. per cycle.

Calculations for washing are based on properties of the filtrate. The liquid velocity $v_l' = (v_l'/v_l)\ v_l = 0.10 \times 0.0335 = 0.00335$ cu. ft. per (sq. ft. sec.) = 0.00335 $\times$ 7.48 $\times$ 60 $\times$ (60/360) $\times$ 25 = 6.28 gpm. From Fig. 5, with $S_r = 0.19$ and $v_l'/v_l = 0.10$, $v_a'/v_a = 0.175$ and $S_e = 0.48$. Then $v_a' = (v_a'/v_a)\ v_a = 0.175 \times 5.56 = 0.973$ cu. ft. per sec.? Now $t_3 = (60/360) \times 60 = 10$ sec. So $V_a = v_a t = 0.973 \times 10 = 9.73$ cu. ft. per sq. ft. per cycle.

In the second dewatering, $t_4 = (90/360) \times 60$ sec. = 15 sec. The time to reach $S_r = 0.48$ is about 1 sec. and may be neglected. Now C_1 and C_2 are corrected for viscosity of wash: $C_1' = 1.99/(1.0/3.0) = 0.663$ and $C_2' = 11.11(1.0/3.0) = 3.70$. Then $t_4/C_2' = 15/0.663 = 22.5$. From Fig. 1 with $S_r = 0.19$ and $t_4/C_2' = 22.5$, $S_e = 0.245$ (at cake removal). From Fig. 2 and $S_r = 0.19$, $V_4/C_1' = 12.4$, so $V_4 = 12.4 \times 3.7 = 45.8$ cu. ft. per sq. ft. per cycle.

The blower capacity, neglecting V_1, is calculated: $V_T = V_2 + V_3 + V_4 = 44.4 + 9.7 + 45.8 = 99.9$ cu. ft. per sq. ft. per cycle. From Fig. 4, with $K = 3.94 \times 10^{-8}$, and $\Delta P/L = 4$ in. Hg per in. cake, $F_t = 0.47$. By definition, $F_p = 27.92$ in. Hg avg. pressure in cake /25.92 in. Hg pressure to blower = 1.078, neglecting ΔP through the filter. Then the total required air capacity = 99.9 $\times$ 0.47 $\times$ 1.078 $\times$ 25 = 1,265 cfm. at 4 in. Hg vacuum. Hence, average velocity through cake = 99.9 $\times$ 0.47 $\times$ 1.078 = 50.6 cu. ft. per (sq. ft. min.).

The final moisture content (assuming all liquor as saturated solution) will be: $100\ W = S\ (p/p')\ [X/(1 - X)] = 0.245 \times (75.0/91.4)\ (0.4/1\text{-}0.4) = 0.134$ lb. saturated solution per lb. glauber's salt. At 75 deg. F. a saturated glauber's salt solution contains 26 gm. Na_2SO_4 per 100 gm. H_2O, which is equivalent to 57.1 gm. Na_2SO_4. 10 H_2O per 126 gm. saturated solution, or to 68.9 gm. free H_2O per 126 gm. saturated solution.

Therefore the final moisture content is 0.134(68.9/126)/[1 + 0.134 (57- 1)/126] = 0.0691 lb. water per lb. glauber's salt.

In acknowledgment, the authors wish to state that this work was made possible through a project in the Engineering Research Institute of the University of Michigan, sponsored by the Swenson Evaporator Co. for the study of the basic problems of rotary vacuum filtration. Joseph Allerton and Henry Dombrowski assisted materially in making the necessary calculations.

REFERENCE

1. Brownell, L. E., and Katz, D. L., *Chem. Eng. Progress*, **43**, 537 (1947).
2. Brownell, L. E., and Katz, D. L., *Chem. Eng. Progress*, **43**, 601 (1947).
3. Brownell, L. E., and Katz, D. L., *Chem. Eng. Progress*, **43**, 702 (1947).

CONSTRUCTION MATERIALS for HIGH-PRESSURE EQUIPMENT

These are the construction materials chosen—with exceeding care—for the new Bureau of Mines coal hydrogenation plant.

A. G. HARDING

Note: Last month's high pressure report did not deal with the metals and materials used by the Bureau of Mines in their new high pressure coal hydrogenation plant. The fact that this article was in preparation was one reason for leaving such information out.—Editor

One of the major problems in designing high pressure equipment is the choice of construction materials. Problems encountered involve metal strength, ability to withstand erosion, corrosion and hydrogen attack. The materials used in the prototype coal hydrogenation plant now being operated by the U. S. Bureau of Mines at Louisiana, Mo., represent perhaps the latest thinking of engineers on this subject.

Choice of construction materials for this plant was a serious problem because of the conditions involved. The hydrogenation pressure is 10,300 psig., with temperatures over 900 deg. F. More than that, the raw material for the hydrogenation is a mixture of ground coal suspended in oil. The resultant paste is viscous and hard to handle. After hydrogenation, the remaining paste has to be let down in pressure, and in so doing it practically sandblasts let-down valves and separators. Hydrogen sulphide is present as a corrosion hazard, and hydrogen attack is always a problem when high temperatures are combined with high pressure.

The first step by Bureau of Mines and Bechtel Corp. (the plant designers and builders) was to review data from German coal hydrogenation plants. This led to some significant conclusions concerning selection of construction materials. It was apparent that many materials used in commercial German plants were chosen more on the basis of their availability than on optimum suitability for the application. Due to scarcities of alloy materials such as chromium, nickel, vanadium, tungsten, and others, chemically low grade alloys were used even under the most severe operating conditions. Whatever shortcomings they had as alloys were somewhat rectified by careful heat treatment. Only a few of the alloys had a counterpart in commercial production in the United States. No experience in the complicated heat treatment necessary for their successful application was available in this country. There was considerable evidence to indicate that the Germans would have used different materials, primarily higher alloys, if they had been available.

Consequently, it was decided early in the job that standard commercial materials would be employed in the design of the demonstration plant. Final selections of materials were decided in consultation with leading established suppliers of similar items of material and equipment in this country.

Converter head assembly. (All photos from Bureau of Mines coal hydrogenation plant.

CONVERTERS

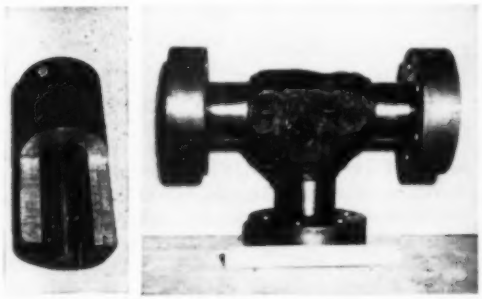
The converters and their allied equipment were one of the major material problems. The reaction temperature of the process is about 970 deg. F., which would be high enough to reduce considerably the allowable working stress of vessel shells exposed to the internal fluids. To utilize the full low temperature properties of the steel to be chosen, the inside walls of all high temperature vessels were lined with a three inch layer of asbestos cement, which reduces the metal temperature to about 500 deg. F.

The converter shells are 32 in. inside diameter with 8¾ in. walls, and are about 40 ft. high. They are forged from a 3 percent chrome, 0.65 percent nickel, 0.3 percent molybdenum steel with a tensile strength of 100,000 psi. and an elastic limit of 55,000 psi. Wall thickness was calculated by the Lamé formula with an allowable working stress of 25,000 psi. Heads, which are subject to higher temperature because of the reacting fluids flowing through them, are of

A. G. HARDING *is a project engineer with the Bechtel Corp., San Francisco, Cal. He was in charge of design of the Bureau of Mines' new coal hydrogenation plant.*

4 to 6 percent chrome, 1 to 1.25 percent nickel, and 0.4 to 0.8 moly.

High pressure separators are forged from similar steel. However, the second, cold separator has a replaceable internal wear plate which is made of carbon steel. Here the low temperature precludes the possibility of hydrogen attack.



For high pressure: 2-in. tube and forged 2-in. T.

PIPE & FITTINGS

Piping materials were divided into three service classifications with common dimensional standards and a maximum working stress of 22,900 psi. For low temperatures up to 375 deg. F., tubing was produced to Babcock & Wilcox Specification MT-1040 with a yield strength of 55,000 psi. Later SAE-4130 with a yield strength of 60,000 psi. was recommended as a substitute due to its better weldability, and some tubes were produced of this material.

Fittings were forged from billets and bar stock of SAE-1030 with a yield of 45,000 psi. Flanges were forged to ASTM-A105 Grade II with a yield of 36,000 psi.

For medium temperatures, 375-850 deg. F., tubing was Babcock & Wilcox Croloy-9M, 9 percent chrome, normalized and drawn at 1,200 deg. F. to a yield strength of 82,000 psi. Fittings were forged from 18-8 Type 304 stainless steel billets with a yield of 30,000 psi. Flanges were carbon-moly ASTM A-182-44, Grade F1, with a 45,000 psi. yield and Type 304.

For the highest temperatures, above 850 deg. F., tubing was 16-13-3 AISI Type 316, stainless steel ASTM-A213-44, Grade T20, and A269-44T-316 with a yield (0.2 percent offset) of 30,000 psi. This material was selected because of its high creep strength. Fittings were forged from the same material. Flanges were Type 304 stainless steel. Six sizes of tubing were established, varying from ¾ in. to 2½ in. inside diameter and from 1⅝ in. to 4¾ in. outside diameter.

Tubing suppliers questioned their own ability to produce tubing of the specified materials and to the required dimensions. Babcock & Wilcox accepted an order to produce three experimental preheater tubes of Type 316 stainless steel in the largest size. Successful completion of these tubes led to their award of all orders for heavy walled tubing.

One major difficulty was encountered in the production of the tubing. In order to produce such heavy walls, tube rounds were pierced with conventional equipment and the subsequent reduction of outside diameter by hot finishing methods retained sufficient wall thickness. In certain sizes this hot finishing in a sinking mill produced an inside bore roughly square in cross-section. Carbon steel tubing produced in this manner had to be rejected and alloy tubing was mechanically bored to a circular cross-section. Subsequently, all tubing was ordered cold drawn and no further difficulties were encountered.

Suppliers of standard commercial pipe fittings were unable to produce seamless fittings by conventional methods because of the heavy wall thicknesses. Fittings were confined to elbows, tees and reducers, and were forged from solid billets. Tees and reducers were forged to shape and then bored and machined to finished dimensions. Elbows were made from forged solid cylinders, slightly offset, and then bored through. The bending was completed in the direction of the original offset after boring and the result was a short radius elbow of surprisingly uniform cross-section.

Both are 2-in. valves; big one is for high pressure.

VALVES

Low temperature valves have bodies of carbon steel, SAE-1030, with a yield point of 45,000 psi. For medium and high temperature service, alloy steel bodies were used—ASTM-A-182-44, Type F-8m, (AISI Type 316) with a yield of 30,000 psi. In almost all cases the valve seats and disks are hard faced with a weld deposit of Stellite. In the case of special throttling valves, the seat and disk are of Kennametal, a cemented carbide of extreme hardness. In these valves the expansion chamber is fitted with a renewable "target" with a concave spherical surface which is hard-faced with Stellite.

Design and construction of the demonstration plant has fulfilled a primary objective. Operation of the plant will undoubtedly see more objectives attained. The ability of American manufacturers to produce the necessary materials and equipment has been proved beyond doubt. Valuable knowledge in high pressure techniques has been gained by the designers, manufacturers and constructors. The operation of the plant will test the validity of the new ideas used.

Editorial Viewpoints

SIDNEY D. KIRKPATRICK and Staff

For Postwar Achievement

On behalf of Professor Emeritus Alfred H. White and his distinguished committee of the senior chemical engineering educators of the United States, it is our privilege as sponsors to announce that Celanese Corp. of America is to receive this year's Award for Chemical Engineering Achievement. This tenth award is in recognition of the outstanding program of post-war developments in the chemical, plastics and textile industries successfully consummated through the resourceful teamwork of chemical engineers.

The event will be appropriately celebrated at a subscription dinner to be held at the Waldorf Astoria Hotel in New York on Thursday, December 1, 1949. Members and friends of the chemical engineering profession are invited to share with us and the committee in according this recognition to a group that has contributed notably to the advance of our industry and profession.

Higher Productivity, Lower Costs

The war is over, in an economic sense, says *The Economist* of London, in a brilliant editorial entitled "Terminus or Turning Point?" What is happening in Britain, and in this country too, can be simply explained. During the war the test of any economy is how much, in quantity, can be produced irrespective of cost. Peace imposes a different test: How much can be sold at a price people can afford to pay and which will at the same time provide a profit incentive for continued production? Thus the problem comes right back to productivity and costs—a fundamental ratio that we lose sight of in boom times in a world dominated by shortages of goods and services.

So our British friends are beginning to realize that national and international policies may be mere palliatives in their present crisis. "The simple test of all policy now must be whether or not it serves the purpose of reducing the costs of production. To anyone who considers the matter impartially, it must be clear that the present policy—the core of which is to subordinate everything else to full employment and social security—will not serve the purpose. The reason is not very far to seek. Cutting costs is a painful operation. It will not be undertaken simply because Ministers make radio speeches saying that the national interest requires it. It will be undertaken only when the individual manager or the individual worker finds himself under individual pressure to cut the costs for which he is responsible as the only means of avoiding something he dislikes even more."

Fortunately our plight over here is a comparatively happy one. We face no national crisis calling for the drastic measures of super-austerity. There is nothing wrong with our economy that cannot be cured by increasing efficiency through higher productivity and lower costs. We have indeed reached a turning point if we but accept the challenge of competitive efficiency in all our processes, plants and industries.

Competing With Natural Gas

A major shift in supply of gas for urban areas is under way. Long-distance pipelines are bringing natural gas from the Gulf Coast areas to New York and New England. The old-type manufactured gas works is passing out of the picture. This is creating a new type of chemical engineering in the field of fuel processing. It is also creating a new set of problems for every fuel-using process industry.

Nearly a quarter of the population of the United States is to be affected by changes in gas supply which are now beginning. We suspect that a comparable proportion of process industries will be compelled to re-appraise their fuel supply problems. This will be done with one substantial advantage on the side of the industrial gas purchase, but with some obvious disadvantages also in prospect.

The advantages arises from the fact that our industries can offer an almost uniform year-round load for the pipeline and the utility company. This approach to 100 percent capacity load factor makes our plants very attractive customers. At the other extreme is the house-heating home owner who offers a capacity load factor of the order of 15 percent. But no one should expect that the utilities are going to be rushing around offering industrial contracts to absorb the natural-gas supply. Were they to do so,

they would quickly find themselves in trouble with the Federal Power Commission and the state utility control agencies.

All this means that many of our process industry establishments may find themselves forced into the gas business if they insist on having gaseous fuel for plant operations. In this situation chemical engineers can now find one newly comforting development. At the present time, fuel raw materials are becoming competitive in price for gas-making with the pipeline gas brought 1,200 to 2,000 miles to market. Furthermore, there are new engineering techniques developed by city-gas companies which permit processing of heavy oils into gaseous fuels at costs for labor and capital far less than were feasible only a few years ago.

Generalization is dangerous except in one regard. The supply of industrial fuel gas must be reappraised in the light of new transmission lines and new oil and coal processing methods. Otherwise there is no certainty that our industries will benefit through lower-cost industrial fuels.

Economic Cooperation

World economics, as we view them from our chemical engineering point of view, seem to hurry from one crisis to another. Probably economics have always appeared to be "critical" from the technologists' point of view.

Perpetual problem is the so-called favorable balance of trade which has been enjoyed by the United States for many years. As long as we insist on exporting more goods than we import, the dollar balance elsewhere in the world is likely to continue to decrease.

Suggestion as to what goods should be imported in greater quantity than in recent years will lead to partisan cries of injury, both real and imaginary, with one or two possible exceptions. Injury may have to be faced, however, if anything approaching worldwide economic stability is to be achieved. Injury is certainly being suffered by many foreign countries, though not altogether because of our favorable balance of trade.

Strategic and critical materials needed for our national stockpiles certainly are in the category of desirable imports. Any means by which the stockpile program can be speeded up should be encouraged by the chemical industry. In this connection we note the recent announcement by Economic Cooperation Administration that purchases of something over $50 million worth of critical materials have been negotiated. While this represents less than 2 percent of the total funds required for the program, it literally and figuratively comes as one of the most appropriate items under the heading of "Economic Cooperation."

Second exception is perhaps best illustrated by the recent Congressional amendment to the ECA law guaranteeing conversion of foreign investment receipts into dollars up to 175 percent of the sum invested, compared with the former 100 percent limit. Although there is a time limit on this conversion guaranty, the fact that receipts may be converted to dollars, whether principal, capital gain, or income, should stimulate the flow of U. S. capital into Marshall Plan countries. Here again is real economic cooperation. The chemical industry can do its part.

On Selling Safety to Society

Do you ever wonder what the man in the street thinks of us—and our work? Does he have any real appreciation of the part chemical enterprise is playing in his everyday life? Are we still regarded as the miracle workers who promised but haven't quite delivered that brave new world? Is the general public becoming increasingly critical of chemical industry as the screaming headlines blame us for all manner of misdeeds—from smog and stream pollution to wholesale poisoning of foods and drugs, from Holland-tunnel fires to disasters like Donora and Texas City?

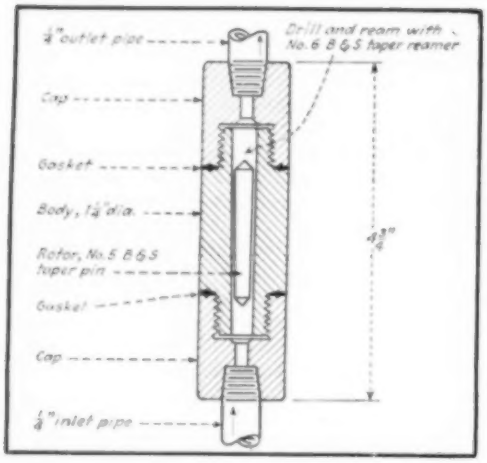
Those who have made a careful study of public relations tell us that chemical industry has a long way to go in gaining real understanding and adequate appreciation of our place in society. The average citizen has little or no contact with basic chemicals. His general reading does little to offset the confusing clamor of radio and newspaper advertising with its exaggerated claims for chemical miracles. He would like to believe that science is contributing to his health and safety—as well as his comforts and conveniences. Yet, in absence of information to the contrary, he is apt to believe that the public is paying dearly for these contributions in occupational diseases and loss of life and limb.

Those of us in a position to know believe that the chemical companies of the country, especially the larger ones, have made a sincere and unusually thorough effort to find out and face the facts of safety in production, transportation and use of chemical products. In very few cases, however, has any adequate effort been made to transmit that knowledge to all parties—including the general public—that have a right to be interested in such matters. This sort of education is not easily accomplished, and for the industry as a whole it would cost a substantial amount of money. But it can pay off handsomely when occasional misfortunes come, as they always will, to upset the best of safety records.

Trade associations in certain branches of chemical industry have already started to survey feasible methods of educating their customers—and the general public as well—in the proper distribution, handling and use of many chemical products. But it is a much bigger job than any one group can accomplish. It calls for coordinated effort on the part of all of us who are concerned with the good names of our companies and ourselves as citizens.

The Plant Notebook

THEODORE R. OLIVE, *Associate Editor*



Double-Acting Safety Flow Valve For Compressed Gases*

WALTER R. EHRICHS, *Jackson Laboratory, E. I. du Pont de Nemours & Co., Wilmington, Del.*

★July Contest Prize Winner

In using compressed gas from a cylinder, one often has trouble because of sudden changes in pressure downstream from the cylinder. A sudden increase in the downstream pressure will force material backward into the cylinder. A sudden decrease in this pressure, such as would result from the rupture of a safety disk, will cause rapid loss of the gas.

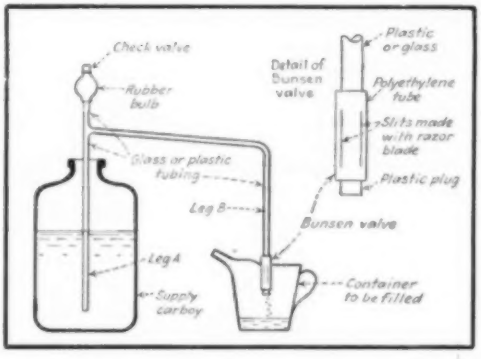
To eliminate these difficulties, a simple, inexpensive valve has been designed. The valve, shown in the drawing, consists of a tapered vertical passageway containing a pin of somewhat smaller diameter and corresponding taper. The pin has conical ends which conform to a seat at either end of the passageway. When gas flows at the desired rate, the pin floats in an intermediate position. Any reverse pressure will force the pin downward against the conical seat at the lower end of the passageway. This will prevent backward flow of material. A sufficient decrease in downstream pressure will cause the pin to be driven upward against the seat at the upper end of the passageway. This will block the flow of gas from the cylinder.

A valve having the dimensions given in the illustration, when used at 50 psig. to 100 psig., will allow gas to pass at a maximum rate of 210 std. cu. ft. per hr. but will close when the rate exceeds this value. At 1,500 psig. the valve will allow gas to pass at a maximum rate of 900 std. cu. ft. per hr.

The valve may be adapted for various pressures and maximum rates of flow by altering the weight of the pin or the clearance between the pin and the wall.

Because of its simple design, the valve may be constructed of a wide range of materials.

* Contribution No. 81 from the Jackson Laboratory.



Safety Siphon for Plant and Laboratory Use

WALTER G. THOMSON, *Minnesota Mining & Mfg. Co., St. Paul, Minn.*

The accompanying sketch and detail show how a simple siphon pump may be made for emptying carboys or similar containers when pouring is unsafe or not feasible for some other reason. The pump is easily and safely started, puts no

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★AUGUST PRIZE WINNER—A $50 prize will be issued to . . .

MURRY L. OLIVER

Research Chemist, Hopewell, Va.

. . . for an article showing how to set up a foolproof system for calculating the performance of evaporators, involving three charts which can be used with ease by any plant operator. This has been judged the winner of our August contest and will appear in the October issue.

$50 PRIZE FOR A GOOD IDEA—Until further notice the Editors of *Chemical Engineering*, will award $50 cash each month to the author of the best short article received that month and accepted for publication in the Plant Notebook.

The winner each month will be announced in the issue of the next month, e.g., the September winner will be announced in October and his article published in November. Judges will be the Editors of *Chemical Engineering*. Non-winning articles submitted for this contest will be published if acceptable at usual space rates.

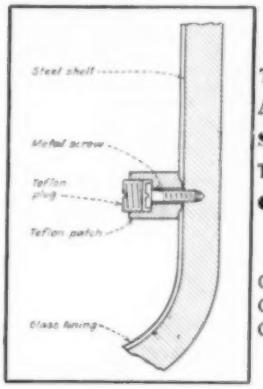
HOW TO ENTER CONTEST—Any reader of *Chemical Engineering*, other than a McGraw-Hill employee, may submit as many entries for this contest as he wishes. Acceptable materail must be previously unpublished and should be short, preferably not over 300 words, but illustrated if possible. Articles may deal with any sort of plant or production "kink" or short-cut that will be of interest to chemical engineers or others in the process industries.

Also, novel means of presenting useful data, as well as new cost-cutting ideas, are acceptable. Address Plant Notebook Editor, *Chemical Engineering*, 330 West 42nd St., New York 18, N. Y.

pressure on the container being emptied, fits a wide variety of kinds and sizes of container, and starts operating almost immediately, even if the supply vessel is nearly empty. The only limitation, outside of that which may be imposed by the materials of construction, is that the level of liquid in the receiving container must be below that of the supply, since the device is of course a siphon.

The pump is started by the suction of a rubber bulb. Leg *A* is inserted in the supply container, and leg *B* in the receiving vessel. The bulb is then squeezed and released, the check valves preventing air from returning to the bulb. This draws liquid up leg *A* until it reaches the tee, when it runs over into leg *B* and starts the siphon action. Siphoning is stopped by lifting leg *A* above the liquid level.

The check valve on leg *B* is preferably a Bunsen valve made of polyethylene tubing as shown in the detail. Although the remaining tubing may be glass, plastic such as polyethylene or Saran is preferable for safety. I have built several from polyethylene and find them very satisfactory. For liquids comparable to water in viscosity an inside diameter of about ¼ in. is the smallest practical size. More viscous liquids require larger tubing, although it may be smaller for less viscous liquids.



Teflon Patches Applied Successfully To Damaged Glass-Lined Kettle

CHARLES S. BROWN,
General Aniline Works, Grasselli, N. J.

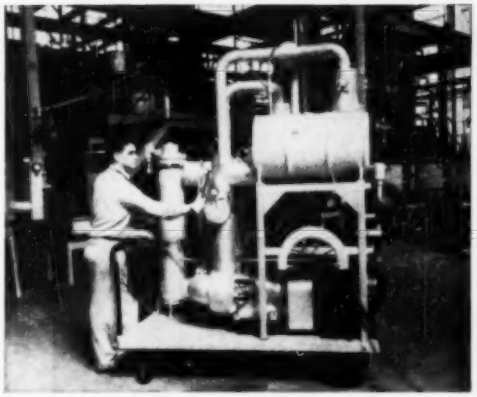
Use of tantalum patches and tantalum screws to repair glass-lined equipment has not been satisfactory in such reactions as halogenations and fuming acid sulphonations owing to embrittlement of the metal. In one case, a reaction involving a bromination in the presence of chlorsulphonic acid at 70 deg. C. attacked the tantalum patches in three months.

A Teflon patch and plug in combination with a metallic screw as illustrated in the accompanying sketch has already been in service for three months and there are no signs of attack. Teflon, the Du Pont Company's chemically inert polytetrafluoroethylene, is resistant to all common acids, alkalis, salts and soivents up to 480 deg. F. Its one "Achilles' heel" is its degradation by molten alkali metals.

Since only the Teflon parts contact the corrosive medium, a steel screw is satisfactory. Any leaks past the Teflon will corrode the screw and cause the patch to fail before the underlying steel shell is damaged. The setup, however, is tight at 45 psig.

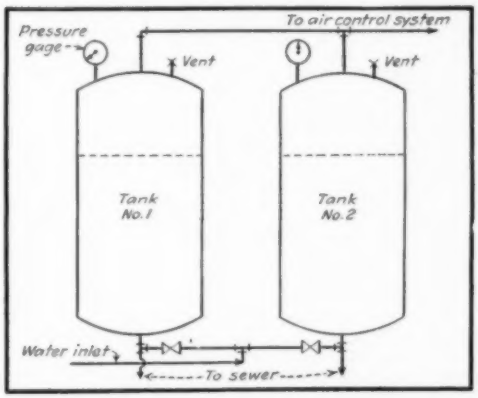
The tantalum patches ordinarily require approximately $11 worth of materials for a ¾-in. square area. In contrast, only $6 or $7 need be expended in providing the machined Teflon for the same size patch.

The use of Teflon, therefore, presents an economical substitute for tantalum in this application.



Portable Heat Generator Uses Liquid Heat Transfer Medium

This portable high-temperature heat generator is used in the Monsanto Chemical Co.'s pilot plant at St. Louis for "plugging in" to any piece of equipment requiring heating at temperatures up to 300 deg. C. It puts out 40,000 Btu. per hr. and employs the company's Aroclor 1248, a chlorinated diphenyl, as the liquid heat transfer medium. Operation is at atmospheric pressure and it is claimed that the transfer compound is stable and noncorrosive to steel.



Providing Emergency Air Supply For Air-Operated Instruments

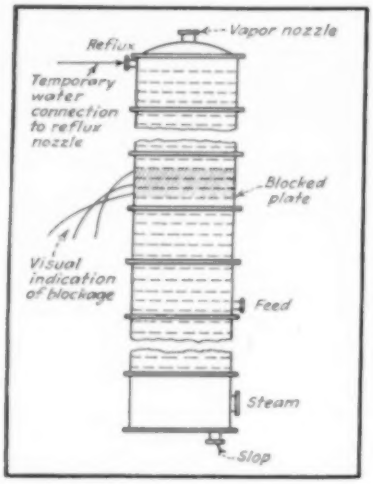
STANLEY YOKELL, *Industrial Process Engineers, Newark, 5, N. J.*

In continuous chemical production, air-actuated controlling devices are very common. Generally the control system is supplied by a small, independent, low-pressure air compressor. Should that fail, air can be supplied from the high-pressure lines through the necessary reducing valves, if such a system exists. However, in case of a power failure, or in plants where there is no independent compressed air system, a simple method for keeping on stream and maintaining air control has been devised.

Two tanks must be made available from the storage or

receiver system. The tanks are fitted with pressure gages and properly cross connected to the instrument air system, and the city water supply system. By closing off all openings except the water inlet line and filling tank No. 1 three-quarters full of water, a pressure of 45 psi. can be built up. The volume of air required for instrument operation is small, with the pressure generally between 15 and 30 psi. With large enough tanks and dextrous filling and emptying, the air-actuated system can be run indefinitely until repairs are effected.

The cost of the water run down the sewer is negligible compared with the cost of going off stream.



Method for Locating Blockages In Distilling Columns

BARRY MOYERMAN, *Chemical Engineer, Publicker Industries, Inc., Philadelphia, Pa.*

Very often a still will develop a blockage on one of its plates which prevents the plate from draining properly. The blockage may be due either to accumulations of inert material or to structural failures within the column. In trouble-shooting it is most important to locate the exact plate at which the stoppage is taking place. The following method will permit quick location of the faulty plate.

Mark the position of each plate of the still on the outer shell. Drill a ¼-in. hole through the shell in the vapor space above each plate. Provide a temporary hose connection to the reflux line or vapor pipe of the still so that water can be introduced at the top and run down from plate to plate. As water is introduced into the still, at a rate approaching the still's actual capacity, one of the holes in the shell will begin to spout water thereby indicating that the vapor space above one of the plates is filling. As the test continues and the column begins to fill, water will appear in the vapor sections of plates which are next highest in the column. The test thus provides a quick visual means for locating the stoppage. The small holes can be patched in many ways perhaps the best of which is by the use of blind rivets.

With some types of stills access to the blocked plate can be had through a manhole or neck and repairs made on the spot. Where several plates are contained in one shell section, only the section containing the faulty plate need be removed to the shop for examination and repair. In either case it is possible to effect a great saving in cleaning and rigging costs and keep lost production time to a minimum.

More on Quick Conversion From Metric to English Units

C. E. FENK, JR., *Chemical Engineering Div., Stamford Research Laboratories, American Cyanamid Co., Stamford, Conn.*

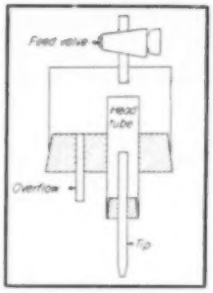
In the "Plant Notebook" for May, H. Richardson presented a simple relation that facilitates gas calculations which involve conversion of molal volumes from the metric to the English system, or vice versa. This conversion is based on the fortunate circumstance that 1 gram mol = 22.418 liters, while 1 ounce mol = 22.438 cu. ft., both at 1 atm. and 32 deg. F. The error in substituting ounce mol for gram mol, Mr. Richardson pointed out, is thus only about one-tenth of 1 percent.

It is interesting that this conversion is based on the approximate relations:

1 ounce = 28.35 grams

1 cubic foot = 28.32 liters

This being the case, the transposition of density values or solution concentrations can be made with an error of the same order of magnitude as that indicated by Mr. Richardson. Thus, grams per liter (which is approximately 1,000 × grams per cc.) is very nearly equal to ounces per cubic foot.



Constant Rate Liquid Feeder

GEORGE A. DEWITT
Chemical Engineer
Tennessee Copper Co.
Copperhill, Tenn.

Circumstances frequently arise when it is necessary to measure a flow rate in a system where ordinary meters are either unavailable or impractical. Recourse may then be had to the dilution test. However, this type of test requires a constant rate of feed of the tracer substance, and most of the designs previously suggested for this purpose involve heavy or bulky apparatus difficult to use on inaccessible locations and in some cases not too accurate.

In an attempt to devise a portable and accurate liquid feeder, the apparatus illustrated was developed. It may be readily constructed from any material desired, and of any suitable dimensions. The principle involved is that an orifice under a constant head will feed at a constant rate. The approximate feed desired is obtained by proper choice of tip. Final adjustment of the rate is made by sliding the tip up or down in the head tube, and thus varying the head. The valve is adjusted so that the fluid is barely overflowing, and this overflow may either be discarded or recycled.

An apparatus of this design fabricated out of glass has been used successfully on numerous occasions, and the deviations from a chosen feed rate have proved to be less than 1 percent.

WESTERN BALANCE

The West's chemical industries have gone far in the past five years; they will go further in the years to come. But in what direction? The answer is the key to many opportunities. And here is the sure half of that answer: Toward better industrial integration. That means more balanced markets—and new ones.

CHEMICAL ENGINEERING REPORT—SEPTEMBER 1949

TO FIND out just what the assets and needs of the West's chemical economy are, we have asked authorities in a cross-section of the area's industry to answer this question: What does your segment of the industry need most for a long-range continued growth, economic stability and better integration?

Here's the theme

This report is the answer, a symposium along the theme of "what we've got—and what we still need." Emphasis is on the what-we-still-need aspect. For after a decade of galloping growth, it's time to stop and take a critical look at the area's industrial gaps.

Several basic needs pop up time and again, with interesting variations, throughout all segments of the industry: (1) better integration of the over-all industrial economy, (2) a more favorable freight rate structure, (3) more diversified markets, (4) more competitive wage rates. Other "still-needs"—such as better or cheaper raw materials and closer sources of materials and supplies—characterize some of the industries.

What are the outstanding industry gaps in the West, gaps that the chemical industries would like most to have filled? Two stand out like sore thumbs: (1) a textile processing industry, and (2) a better rounded out synthetic organic chemical industry. Both, of course, are related. Here are some of the others: more tanning operations, a flat glass industry, assembly industries that use local resins and plastics, fabricating facilities for light metals, a host of specialty chemical operations.

Why we point

Why point the finger at these gaps in the West's chemical economy? The answer is

obvious: Where there's a need there's an opportunity—real or potential—for somebody to do something about it. The purpose of this report is to focus attention on these opportunities in the nation's youngest and fastest growing industrial area. It is an area of "still-needs" that are forever shifting and changing as more bits and pieces are added to its industrial mosaic.

Heavy Inorganic Chemicals

WEST HAS—

In general, a good balance between supply and demand.
Expanding markets.

WEST NEEDS—

Better industrial integration of consuming industries.
Such industry markets as plate glass, textiles, plastics.

T. B. GIBSON, Research Analyst
Stauffer Chemical Co., San Francisco, Calif.

The manufacture of heavy chemicals in the West expanded at a fast rate during the war; this has continued at a speed that has diminished little. Probably $50,000,000 or more has been spent in the area since the war for new facilities to manufacture heavy chemicals (not including chlorine, caustic soda, soda ash and salt cake). While the rate of new construction fell off this year, it has by no means stopped. Here are some of the heavy chemical plants that have been built or enlarged since the war.

Soda ash and borax

American Potash & Chemical Corp. spent about $7,000,000 on a new production unit to recover borax and soda ash from the deep brines of Searles Lake. This adds 30,000 tons of borax and 60,000 tons of soda ash to its annual output. West End Chemical Co. spent some $1,500,000 at the same location to up their output of soda ash and borax by well over 50 percent. The firm's annual capacity for these products is now more than 180,000 tons. The three potash producers at Carlsbad—International Minerals & Chemical Corp., Potash Co. of America and U. S. Potash Co.—have invested some $6,500,000 in new facilities. U. S. Potash Co. recently announced a further expansion of $2,500,000.

There has been a number of additions to western sulphuric acid capacity. This includes the $6,000,000 program of Garfield Chemical & Manufacturing Co. in Utah that will add 400-500 tons daily to present capacity. Anaconda's plant in Montana had previously been enlarged. Stauffer Chemical Co. built a 200-ton unit in 1947 at Richmond, Calif., at a cost close to $1,000,000. American Smelting & Refining Co. is putting up a 100-ton unit at Tacoma to cost around $1,000,000. This firm is now operating a 20-ton per day liquid SO_2 plant at

HOW THE WEST STACKS UP WITH THE NATION IN A DECADE OF GROWTH

	1939	1941	1945	1946	1947	1948
Civilian population (millions):						
United States	130.9	133.6	127.5	138.4	142.7	146.1
Western States (11)	17.7	14.3	15.6	17.1	17.9	18.7
Pacific Coast States (3)	9.6	10.1	11.7	12.9	13.6	14.1
Chemical & allied employment (1,000):						
8 Western States (June)*	19.1		39.2	38.5	41.6	46.3
Chlorine production (1,000 tons):						
United States	511	801	1,192	1,165	1,447	1,621
Western States				122	160	164
Sulphuric production (1,000 tons, 100%):						
United States	4,793	6,771	9,522	9,283	10,575	10,231
Western States	376		680	588	749	736
Soda ash production (1,000 tons, 98–100%):						
United States	2,918	3,724	4,557	4,494	4,800	5,170
Western States	122	118	182	209	281	297
Nitric acid production (1,000 tons, 100%):						
United States	168	347	447	574	1,190	1,133
Western States				50	58	55

* Arizona, California, Montana, Nevada, New Mexico, Oregon, Utah, Washington. June, 1949, employment was 44,700. All figures from the Bureau of Census or Bureau of Labor Statistics. Table does not include production from government plants.

Selby, Calif. Standard Oil of California put in facilities costing $500,000 to recover 50-75 tons of H_2S daily at their Richmond refinery; General Chemical Co. will convert the H_2S to sulphuric acid.

Sulphur is important

Among those developments of great interest to the economy of the West are the three new plants to recover elemental sulphur. Texas Gulf Sulphur Co. will use the Girbotol process at Worland, Wyo., to recover 300 tons or more daily from sour natural gas of the region. The plant of Stanolind Oil & Gas Co. at Powell, Wyo., produces 50-75 tons of sulphur daily by a similar process. Hancock Chemical Co. now recovers 50 tons daily from H_2S received from several major refineries near Los Angeles. A second recovery unit of the same capacity is being considered. Other sulphur recovery plants will probably be built as the air pollution abatement program progresses.

Chlorates and phosphates

Several interesting chemical developments have taken place since the war at Henderson, Nev. Western Electrochemical Co. put in chlorate cells and equipment in 1945. The capacity of this plant has now been enlarged to 1,000 tons monthly of chlorates and perchlorates. Westvaco's elemental phosphorus furnaces at Pocatello, Idaho, and the new phosphate chemical facilities at Newark, Calif., are said to represent an investment of over $5,000,000. A. R. Maas Chemical Co. in Los Angeles (recently bought by Victor Chemical Works) has more than doubled its output of phosphoric acid and phosphates at a cost of approximately $500,000.

Both Shell Chemical Corp. and Hercules Powder Co. have enlarged their ammonia plants; total cost was about $2,000,000. The Great Western division of Dow Chemical Co. has put $3,500,000 into its integrated plant at Pittsburg, Calif. This materially increased the plant's capacity to make caustic, chlorine, chlorinated solvents and xanthate mining reagents.

Missing links

But what are the major missing links in the West's heavy chemical industry? By and large, the heavy chemicals needed by today's western economy are supplied locally. What is needed most is a more advanced over-all industrial integration. The chemical gaps will be filled in as this industrial picture is completed.

Take a few examples: The West has no real textile or plate glass industries; tanning and plastics manufacture are minor operations. Only recently have automobile assembly, steel and soap operations been present in any real volume. Therefore products like bleaches and dyes, cellulose, chrome chemicals, methanol, formaldehyde, ethylene and the vinyls will be made in volume only when there are enough local consuming industries to demand them in volume.

The output of caustic soda, sulphuric acid, acetylene, chlorinated solvents and the like will follow the rise and filling in of gaps of the West's industrial economy. For example, should a rayon unit be built to supply the present population of the western states, here are the new annual markets for chemicals that would be created at once: 50,000 tons of sulphuric acid, 12,000 tons of CS_2 and 40,000 tons of caustic soda.

For some chemicals, such as phenol, the raw materials and markets already exist; it is only a matter of time until new plants will be built to make them.

The capital and know-how for these heavy chemical manufactures exist either locally or with eastern firms already operating in the West in other fields. Sooner or later the West's chemical industry will become rounded out and the gaps filled in—and many people are betting it will be sooner.

Caustic and Chlorine

WEST HAS—

Freight rate protection from outside producers.
Fast-growing industrial markets.
Good agricultural markets.
Reasonable power rates.

WEST NEEDS—

More diverse markets.
A textile industry.
More diversified organic chemical industry.

A Contribution from the Industry

Caustic soda and chlorine are manufactured for sale in five plants in the West. Three of these are located in the Northwest, one in California, and one at Henderson, Nev. It is estimated that these plants have an installed capacity of 500-550 tons of chlorine. Although some areas enjoy better economic balance than others, the industry as a whole is probably operating at about 60 percent capacity. In addition to these commercial units there is one small captive bleach plant in California; there is also capacity at Ladora, Colo., that to the best of our knowledge is not being used.

Western caustic-chlorine producers have these sound points in their economy:

1. Labor-management relations are good and

WHO GETS THE WEST'S 1949 CAUSTIC AND CHLORINE

	Estimated Percent
Chlorine	
Pulp and paper	44
Chemical manufacture	31
Water and sewage	7
Miscellaneous	18
Caustic Soda	
Pulp and paper	26
Petroleum refining	24
Soap and synthetic detergents	16
Chemical manufacture	8
Miscellaneous	26

very little work stoppage has come about in the past several years.

2. They have protection from eastern, midwestern and southern producers by trans-continental freight rates which preclude westbound movement on heavy-tonnage low-price commodities. The western states buy substantially no chlorine produced outside of their boundaries. In the case of caustic soda, about 3-5 percent is shipped in from outside the area. This is usually mixed alkali for the bottle wash and dairy trades.

On the ground floor

3. The western caustic-chlorine producer is on the ground floor of the fastest growing industrial section in the country. Since caustic soda and chlorine are such basic commodities, nearly all industrial expansions increase the consumption of one or the other or both.

4. Western agricultural lands contain a large portion of the high-priced farm lands of the nation. To fully utilize these, the western farmer uses more agricultural chemicals per acre than the national average. In the last few years organic chlorine compounds have become increasingly more important among these agricultural chemicals.

5. Power costs are reasonable, though not always the cheapest in the nation.

6. First-rate western universities supply a steady source of well-trained technical personnel.

Not a clean bill of health

But the western caustic-chlorine industry still needs several things before it can be said to be in superb health. The more important ones are outlined in the paragraphs to follow.

1. A more diverse market is without doubt the prime need. Western producers depend too much on the pulp and paper, petroleum and soap industries. The economic ills of any one of these reflect immediately and severely upon them.

The greatest industrial weakness of the West is the lack of a textile industry. It is logically assumed by many that if the textile industry does start to move West, rayon plants would follow in short order. The western caustic-chlorine producers do not sell one pound of caustic soda to the rayon industry—nationally the largest consumer of that commodity.

Weak spot: Synthetic organics

The West is weak in organic chemical production. Thus both chlorine and caustic are seriously affected by the lack of diversification in another major market.

Geographical dislocation between the major markets of chlorine and those of caustic is another strike against the industry. The pulp and paper industries center in the Pacific Northwest; these require considerably more chlorine than caustic. Producers in this area must therefore market a portion of their caustic tonnage in southern California and compete there with a producer who enjoys a sizable freight advantage. In turn, the southern Nevada plant, which is well situated to supply the southern California market on caustic, is handicapped because of an inadequate chlorine outlet.

Needed: better freight rate structure

2. A better freight rate structure is vital to the economic health of western producers of caustic and chlorine. They definitely need more favorable water rates to the Orient in order to compete with Gulf and eastern producers. Western firms must operate under handicaps of basically higher costs. Yet the existing water rates to the Orient are the same regardless of the port of embarkation. This means that western producers will not, in a free competitive market, be able to enjoy any of the foreign trade that they are geographically located to serve.

Western producers must have better freight rates into the Intermountain Area before they can compete with these same Gulf and eastern low-cost producers in that area. It costs the western producer just as much to ship into some of the Intermountain Area that is closest to his plant as it does for him to ship to Chicago. Unfortunately, many freight rate structures are not based on logic.

Salt costs too much

3. Raw material costs are a handicap to the western caustic producer. The table below illustrates the disadvantages that this industry must overcome if it is to compete successfully with Gulf Coast producers.

	Western Costs	Gulf Costs
Salt, per ton	$3.50-$8.00	$0.50-$1.50
Power, mills per kwh	3-5	3-5
Fuel, per 1,000,000 Btu.	28-33C.	5-10C.

In addition to these obvious price disadvantages, particularly with salt and fuel, the salt of the West has not been of the highest quality. Likewise, fuel costs fluctuate directly with prices paid for crude oil. A general increase in the price of crude oil in the West has worked a hardship on the caustic industry.

Although the West's producers enjoy the benefits of a rapidly expanding market, this market also pyramids the demand for water and its corollary, cheap power. It is impossible to generate low-cost power with the fuel costs indicated above. Yet the management of water resources for power purposes is not compatible with its management for use by an ever-increasing population and expanding agriculture. The caustic industry will eventually have to cope with the fact that as its market increases, its basic commodity—cheap power—will decrease.

To sum up, the West's caustic-chlorine industry is able to take care of the markets for which it was established. It is able to supply these consumers and to realize a profit. However, because of the large gaps in the area's basic economy, it has not kept pace with the national expansion of the industry; nor does it appear that it will be able to do so on its own efforts. It will have to wait for further industrial development of the area before it can find the solution of those basic problems. But when they are found, the West's caustic-chlorine industry will go ahead with vigor.

Synthetic Resins

WEST HAS—

A growing industry.
Tremendous potential market.
Ingenuity of trade in developing new markets.

WEST NEEDS—

More balanced industrial integration.
More local suppliers of materials.

ARTHUR J. NORTON

Arthur J. Norton Laboratories, Seattle, Wash.

"Resins and plastics . . . the industry . . . is difficult to analyze," said an article in *Chemical Engineering* (Sept. 1947) just before the time of the first Pacific Chemical Exposition. "Is the industry too small? Is it out on a limb?"

The industry is sound

Now, two years later, we have well-established organizations in most of the fields of resin and plastic utilization. Most of these firms have been through a postwar readjustment and are in good shape. In fields where the volume warrants, there are producers of resin and plastic materials here on the West Coast. There are, at least potentially, enough basic chemical sources to meet any raw material needs that the volume would justify.

Yes, it is "too small"—and we hope we always feel it is, regardless of its actual size. It is "difficult to analyze," particularly in terms of eastern resin and plastics industries. Since the plastic materials and resins are still largely supplied from the East, it is difficult to get an accurate breakdown of the volumes used in the western area.

It has some quirks

Besides, our over-all western industrial development, while rapid, has been somewhat unbalanced. The resins and plastics industry has been hampered since its beginning on one hand by inadequate local material supplies and on the other by insufficient markets. Operating in a field completely dominated by large eastern industries, it has had to pioneer and steer its growth to fit the available markets and to create new ones. Many resin items looked on as "specialties" by eastern manufacturers have been our main lines of growth. Consequently a direct comparison with eastern industry in a conventional type of analysis is liable to be misleading.

Our population has grown to over 12 percent of the nation's, while our usage of consumer items averages 15—16 percent of the United States total. A tabulation of products using plastics that will be sold on the West Coast this year would show that we have a tremendous potential market for finished plastic items. The tabulation would include automobiles, electrical equipment, radios, refrigerators and other items that should consume about 180,000,000 lb. of resin and plastic materials. This represents 15 percent of the national consumption.

Need large assembly plants

We actually use, however, only about half of this amount. Excluding the protein adhesives used in the plywood industry, we will use about 90,000,000 lb. of resins and plastic materials for converting purposes in 1949. The reason we use so little in our industries is simple: we have very few large assembly industries. These industries in the East provide the biggest market, either direct or indirect, for eastern plastics materials suppliers.

The reason we consume as much resins and plastics materials as we do lies in the ingenuity of our molders and fabricators in reaching for new markets, plus the growth of industries basic to the West—such as the plywood and other forest products industries. These have now developed large eastern markets. Our coating industry is well established and consumes products in proportion to the purchasing power of our growing population.

A rough breakdown of the western markets for resins and plastics by industry is given in an accompanying table. It would be interesting to compare this analysis with that of eastern industry where electrical, radio, automotive, closure and refrigeration enterprises represent the largest direct and indirect consumers of plastic materials. This table also shows the tremendous growth potential of our industry.

Another table shows the estimated 1949 use of resins and plastics by western industries. This chart needs some explanation.

These come from the East

Almost all of the molding compounds used come from the East. There is only one pilot plant in the West supplying phenolic molding materials; one supplies specialty molding materials. The molding business in the West is largely a custom operation, there being only three or four large departmental molders. Phenolic resins for plywood, hardboard and fiber bonding, however, are now made almost exclusively in the area. Probably 5 or 6 million pounds of low-pressure laminates from polyesters will be made in 1949 on the West Coast. High-pressure laminates, on the other hand,

ESTIMATED WESTERN CONSUMPTION OF PLASTICS AND RESINS FOR 1949

Molding compounds	Pounds
Phenolics	6,000,000
Ureas and melamines	8,000,000
Polystyrene	14,000,000
Cellulosics	2,500,000
Others	2,000,000
Total	32,500,000
For plywood, hardboard, etc. (solids basis)	15,000,000
Laminates, low-pressure*	5,000,000
Coating resins†	
Alkyds	23,000,000
Modified phenolics	12,000,000
Others	2,000,000
Total	37,000,000
Miscellaneous	3,000,000

* May be as high as 6,000,000 lb. † Does not include straight rosin esters.

WHERE RESINS AND PLASTICS ARE USED ON THE WEST COAST

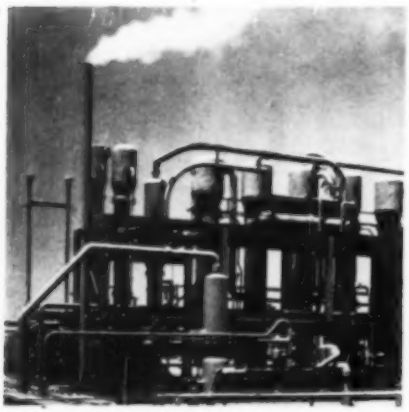
	Percentage of Total, Approx.
Building materials*	17
Coating industry	45
Closures & containers	10
Furniture	7
Aircraft	7
Electrical and radio	7
Miscellaneous†	7

* For plywood, hardboard, rock wool, Fiberglas, insulation, composite laminates and related products. † Ion exchange resins, specialty coatings, casting materials.

will continue to be largely imported from the East; Taylor Fiber Co. is the only high-pressure laminator on the Coast. Most of the laminating resins are made in the East.

It is very difficult to get accurate figures on the western use of coating resins. Rough calculations indicate, however, that fully one half of the coating resins consumed here will be made here. About the same percentage holds true for the miscellaneous items. Conspicuous for their absence from the table are the resins used for coating fibers and fabrics and for treating textiles.

The bulk of the West's resin and plastics consumers were badly hit immediately after the war; but they have built themselves up to substantial consumers since then. Plywood and some other industries are just going through their postwar adjustments. Although the lack of material suppliers in some fields is still a handicap, the gaps are closing rapidly as the industry expands. The industry as a whole is now on a sound basis; it has a tremendous expansion potential.



Synthetic Organics

WEST HAS—
A growing market.
Substantial production of certain organics.
Petrochemical raw materials.

WEST NEEDS—
Certain raw materials, especially aromatics.
Rayon, textile and dyestuffs industries.
Better integration.

RAYMOND H. EWELL Chairman,
Dept. of Chemistry & Chemical Engineering,
Stanford Research Institute, Stanford, Calif.

The West has established a pattern of consumption and production of organic chemicals which differs materially from the pattern in the eastern part of the United States. The West produces many organic chemicals in amounts approximately equal to its requirements; others are produced in excess of requirements; still others are short or lacking altogether and must be imported from the East. These surplus and deficit chemicals in the West are different from those in the East.

A peculiar pattern and why

The particular pattern of the organic chemical industry in the West has developed from a number of causes. Probably the most important has been simply the general historical development of the organic chemical industry which, of course, had its beginnings and principal development in the East. This caused the West to develop a dependence on the East for many organic chemicals; this is difficult to change. Western markets for organic chemicals have developed slowly, but this has been accelerated during the past ten years. Within the next few years, western requirements for many chemicals will reach the "minimum-sized economic unit" which is necessary to initiate production of a new chemical.

Another important factor has been the pattern of available raw materials; this has been stronger in aliphatics than in aromatics. In the last 15 years, cheap electric power at Boulder and Bonneville Dams has resulted in sizable chemical industries based on this power.

The high cost of rail transportation is becoming an increasingly important factor in the pattern of western industry as a whole, including organic chemicals. Other factors which have left their mark on the area's organic chemical industry are: (1) the wartime increase in western steel production; (2) the wartime increase in phenolic-bonded plywood in the Northwest; (3) the wartime rise and subsequent fall of an integrated synthetic rubber industry in southern California.

Points on the negative side

Some of the points in which the western organic chemical industry differs markedly from that in the East are:

1. Limited output of benzene and small production of naphthalene due to the relatively small steel industry in the West.

2. No production of aniline, anthraquinone and beta-naphthol because there is no production of dyes, rubber chemicals, or photographic chemicals in the area.

3. No production of plastics materials with the exception of phenol-formaldehyde and urea-formaldehyde resins for plywood adhesives, alkyd resins, and ion exchange resins (by one company).

4. No manufacture of acetic anhydride; relatively small output of acetic acid and carbon disulphide because there is no rayon industry in the West. This, in turn, is due to the absence of a textile spinning and weaving industry.

5. No production of chemicals based on ethylene due to small Western demand for ethyl alcohol, acetic acid, ethyl chloride, ethylene dichloride, vinyl chloride and others. But there is a good demand for pentaerythrjtol, ethanolamines, ethylene glycol, ethylene dibromide, normal butyl alcohol, polyethylene and some other ethylene derivatives.

6. Very small chemical operations based on acetylene (only trichloroethylene) due, in part, to the comparatively recent availability of cheap power.

7. No production of many major organic chemicals such as methanol, urea, melamine, nitrocellulose, dichlorodifluoromethane, tetraethyl lead and others; very small production of phenol, formaldehyde and others, largely on account of the historical development of the industry, even though there is a good demand for all these chemicals.

Points on the positive side

Characteristic features of the western organic chemical industry on the positive side of the ledger include:

1. Substantial production of methyl chloride, methylene chloride, chloroform, carbon tetrachloride, and perchloroethylene as a result of the early development of the Great Western Electrochemical Co., now a unit of Dow Chemical Co.

2. Large output of cresylic acids, naphthenic acids, petroleum sulphonates, toluene and xylenes as byproducts of the gigantic California petroleum industry.

3. Large production of propylene and butylene derivatives, including isopropyl alcohol, acetone, secondary butyl alcohol, tertiary butyl alcohol, methyl ethyl ketone, methyl isobutyl ketone and others, as a result of the early establishment and growth of Shell Chemical Corp.

4. Large production of flotation agents, particularly xanthates, to supply the western mining industry.

5. Large output of chlorobenzene, chloral, DDT, and benzene hexachloride; these are produced from chlorine made with the cheap electric power at Boulder and Bonneville Dams.

6. Large production of phenol-formaldehyde and urea-formaldehyde adhesives for the plywood industry of the Pacific Northwest.

7. Sizable productions of monosodium gluta-

WESTERN PRODUCTION OF THESE ORGANICS IS SUBSTANTIAL . . .

. . . AND SURPLUS IS AVAILABLE FOR EXPORT TO OTHER AREAS

Acetone
Alginic acid and alginates
Alkyl benzene
Butyl alcohol, secondary
Butyl alcohol, tertiary
Chloroform
Citric acid
Cresylic acids
DDT
Ethyl alcohol
Fatty acids (oleic, linoleic, stearic, palmitic, lauric)
Isopropyl alcohol
Methyl chloride
Methyl ethyl ketone
Methyl isobutyl carbinol
Methyl isobutyl ketone
Monosodium glutamate
Naphthenic acids
Pectin, pectic acid and pectates
Perchloroethylene
Petroleum sulphonates
Sodium alkyl benzene sulphonate
Styrene
Toluene
Xanthates
Xylenes, mixed

. . . AND IS ABOUT EQUAL TO REQUIREMENTS

Benzene
Benzene hexachloride
Butylenes
Carbon bisulphide
Carbon tetrachloride
Chloral
Diacetone alcohol
Nitroglycerine
Nitroglycol
Nitrostarch
Ortho-xylene
Phenol-formaldehyde resins (adhesives)
Propylene
Urea-formaldehyde resins (adhesives)

. . . BUT IS STILL SHORT OF REQUIREMENTS

Alkyd resins
Chlorobenzene
Glycerine
Lubricating oil additives (various)
Phythalic anhydride
Trichloroethylene

WESTERN PRODUCTION OF THESE ORGANICS IS SMALL . . .

. . . AND IS ABOUT EQUAL TO REQUIREMENTS

Chlordane
2,4-Dichlorophenoxyacetic acid
Ethylene
Ethylene glycol and polyethylene glycol esters
Ethyl mercaptan
Glycerol monoesters
Isopropyl ether
2-methyl-2, 4-pentanediol
Mesityl oxide
Metaldehyde
Methyl bromide
Methylene chloride
Naphthalene
Ortho-dichlorobenzene
Para-dichlorobenzene
Pentaerythritol esters

. . . AND IS FAR SHORT OF REQUIREMENTS

Acetic acid
Dichloropropane—dichloropropylene mixture
Ethyl acetate
Ethylene dibromide (mainly in ethyl fluid)
Formaldehyde
Hexaethyl tetraphosphate
Metallic soaps (oleates, linoleates, stearates, palmitates, naphthenates, resinates)
Parathion
Penicillin
Phenol
Tetraethyl pyrophosphate

WESTERN PRODUCTION OF THESE ORGANICS IS NON-EXISTENT . . .

. . . BUT THERE IS SUBSTANTIAL CONSUMPTION

Butyl acetate, normal
Butyl alcohol, normal
Cellulose film, regenerated (cellophane)
Dichlorodifluoromethane
Dinitrotoluene
Ethanolamines
Ethylene dichloride (mainly in ethyl fluid)
Ethylene glycol (mainly in anti-freeze)
Maleic anhydride
Methanol (mainly in anti-freeze)
Molding powders:
Cellulose acetate
Cellulose acetate-butyrate
Melamine-formaldehyde
Phenol-formaldehyde
Polyethylene
Polystyrene
Polyvinyls
Urea-formaldehyde
Nitrocellulose
Pentachlorophenol and salts
Pentaerythritol
Polyvinyl resins (besides molding powder)
Rosin (abietic acid)
Rosin esters (ester gum)
Rubber chemicals (various)
Sodium benzoate
Streptomycin
Tetraethyl lead (in ethyl fluid)
Urea

. . . BUT CONSUMPTION IS SMALL

Amyl acetates
Amyl alcohols
Benzaldehyde
Benzoyl peroxide
Carbitols
Cellosolves
Dibutyl phthalate
Ethyl ether
Ethyl amines
Furfural
Isopropyl acetate
Isopropyl amine
Methyl amines
Oxalic acid
Para-nitrophenol
Polyethylene glycols
And many others too numerous to list.

mate, citric acid, pectin, and alginic acid from California natural raw materials.

8. Sizable output of ethyl alcohol as a result of the availability of Hawaiian molasses.

130 organics classified

Listed in the accompanying tables are over 130 organic chemicals consumed in the West, classified in terms of size of production and consumption in the West. The terms "substantial" and "small" are relative and indicate varying amounts depending on the national magnitude of the chemical. For example, a "substantial" amount of carbon tetrachloride means a larger volume than a "substantial" amount of citric acid. This list indicates clearly the strong and weak points of the western organic chemical economy.

Light Metals

WEST HAS—
Cheap and abundant power (for existing plants).
Expanding markets (industrial and consumer).
Can compete in spite of certain disadvantages.

WEST NEEDS—
Closer source of alumina, coke, pitch.
Closer markets.
Better integrated fabrication industry.

A Contribution from the Industry

The war years brought great prominence to both aluminum and magnesium production in the West, with seven aluminum reduction plants and four magnesium plants in operation.

Marketing possibilities for magnesium have not lived up to expectations so that none of the magnesium facilities, using three different processes, has been operated since the war. Two of them have been converted to other uses and are contributing to the rapid industrial growth of the West. Future western magnesium production would seem to depend upon the further expansion of the metal's uses as well as possible strategic requirements.

At the end of the war there was a breathing space during the general reconversion period. The only aluminum reduction plants kept in operation were the privately-owned plants of Aluminum Co. of America at Vancouver and of Reynolds Metals Co. at Longview.

Who made what moves

In early 1946, however, Permanente Metals Corp. leased and began operation of the government-owned plant at Spokane, and later purchased the Tacoma plant operated during the war by the Olin Industries. More recently, the Troutdale plant has been put into operation by Reynolds Metals Co. The Los Angeles and Riverbank plants have not been operated because of high-cost power and a general shortage of power in California.

The rated capacity of the five operating plants in the Northwest is about 650,000,000 lb. per year. It is estimated that this is 46 percent of the active United States production, which for 1948 amounted to about 1,250,000,000 lb. of aluminum. This national production is not a figure of available capacity because some of the wartime plants are closed and are not economical to operate in the peacetime market.

What, then is the over-all picture which led to the establishment of an electrochemical industry of this magnitude in the Pacific Northwest? What is its status? And what may be predicted for its future?

Cheap power is the key

Obviously, cheap and abundant power has been the dominent factor. Roughly 10 kwh. is required per pound of aluminum produced, and there are few areas in the United States which could supply more than a fraction of the power required for wartime expansion. And power is a "raw material" which cannot be transported over long distances.

Balancing this is the disadvantage that all of the other raw materials must be hauled great distances. This is significant since nearly 2 lb. of alumina and 0.6 lb. of carbon are required per pound of metal.

Alumina takes a long ride

Alumina, with a yield of about 1 lb. from 2 lb. of bauxite, is produced at four plants in the United States. The yearly ton-miles involved are almost astronomical, for these plants are located at East St. Louis, Mo.; Hurricane Creek, Ark.; Mobile, Ala.; and Baton Rouge, La. Economical freight rates for alumina are possible only in trainload shipments and at rates based on them. Even so, almost $17 of the total cost of producing one ton of aluminum in the Pacific Northwest is involved in this single freight item. This is in addition to the 2,690-mi. water journey from Surinam for most of the bauxite.

The quantities of petroleum coke required are not so great, but they are still substantial. Coal-tar pitch used as a binder for electrodes comes largely from the East. Although a small percentage of petroleum coke and pitch requirements are produced in Oregon by Portland Gas & Coke Co., the major source of petroleum coke is California, over 1,000 mi. distant, together with other distant centers of petroleum refining.

The transportation problem of the Northwest industry places it at a serious competitive disadvantage. For example, the Southeast (which has some 45 percent of the nation's aluminum reduction capacity) hauls its alumina raw mate-

rial only about 15 percent, its pitch about 35 percent and its petroleum coke about 65 percent as far as does the Northwest industry.

Will 2-mill power stay?

Whether the power advantages of the Pacific Northwest will continue on the same level remains to be seen. During the past year low water at one period forced a rationing of power by Bonneville Power Administration. In addition, there is a question whether the two-mill power rate for the aluminum reduction industry can be maintained in the future (see "Pacific Power Prospects" in *Chemical Engineering*, April 1949).

Location of aluminum reduction plants in areas of low-cost power has another less attractive aspect: distant markets. Specific area data are not available but it is estimated that 87 percent of the national market for aluminum lies east of the Rockies.

The remaining 13 percent in the West is in general agreement with the proportion of population, coupled with the somewhat lower degree of industrialization. That it is even this high, of course, is due to the rapid increase in population during the past ten years. Continuation of this trend means a continued expansion of aluminum consumption in a region closer to the reduction plants.

Need better fabrication facilities

Again on the unfavorable side is a lack of rounded out intermediate fabrication facilities in the West; this requires transport of metal to eastern centers for fabrication and reshipment to western markets. The only western rolling unit is that of Permanente Metals Corp. at Spokane; the only foil plant was recently established by this company at Permanente, Calif.

A favorable trend, however, is illustrated by the announcement by Aluminum Co. of America that it has under construction a new rod and bar mill at Vancouver to be completed this winter. Western aircraft industries have provided a substantial market, and there are other fabrication industries, including extrusion facilities at Phoenix, Ariz., and casting and extrusion plants in the Los Angeles area.

There is no question that the reduction industry has become well established in the Northwest and has been able to compete with other areas in spite of certain disadvantages. How much of the further expansion of the aluminum industry may be located in the West is difficult to estimate, for the present balance could be easily upset through increases in power and freight rates.

National security may be the key

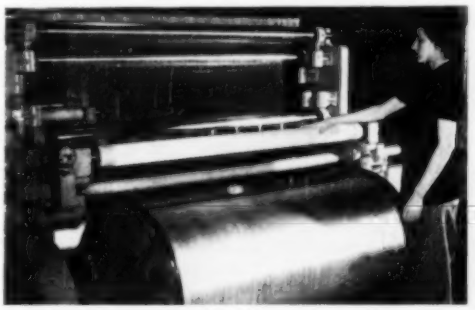
To some extent this may be determined by strategic needs, for we cannot neglect this aspect of the national aluminum industry. From any point of view—and this was clearly demonstrated during the war—the Northwest capacity is vital to the nation. Sound peacetime operations are absolutely necessary for preparedness.

In summary, then, we see that in aluminum a sound electrochemical industry has been built in the Northwest. It is an integral part of a national industry that is operating at a rate several-fold its prewar volume. There is every reason to believe that this rate will be maintained despite any temporary setback and that continued conservative expansion will grow out of the new uses and products that are being steadily developed.

Rayon

WEST HAS—
Substantial markets (industrial and consumer).
Basic raw materials (cellulose and water).
Good plant sites.

WEST NEEDS—
A rayon manufacturing plant.



WILLIAM C. McINDOE
Consulting Industrial Chemist, Portland, Ore.

The western states now have (1) better than 12 percent of the population of the United States; (2) over 17 percent of the nation's automobiles (with an automobile tire manufacturing center in Los Angeles second only to Akron); (3) a major aircraft manufacturing industry—also requiring tires; (4) a young garment and textile industry in California that is already crowding Chicago for second place nationally; and (5) better than the national average per capita income. Yet we have no rayon industry to provide yarns and fabrics for our textiles and cord and fabrics for our tires. No rayon plant has come west of Old Hickory, Tenn.

Two factors control location

For the rayon industry the principal determining factors in plant location seem to be: (1) proximity to an abundant supply of iron-free, soft, cool water and (2) proximity to textile markets. Water requirements of a rayon plant are unusually heavy, since 90-200 gal. is needed to produce one pound of viscose rayon and 400-1,000 gal. for each pound of acetate rayon (included in the latter figures are 8-124 lb. of process steam per pound of yarn). A corollary of this abundant water supply is an adequate drainage area for the disposal of waste liquors.

Dependable low-cost power or readily accessible supplies of fuels for steam-power generation

HOW BIG IS THE WEST'S POTENTIAL RAYON MARKET?

	Millions of Pounds	
	1945	1948*
Textiles	72.2–85.7	114.2–135.6
Tire cord & fabric	79.0–79.0	79.0–79.0
Total	151.2–164.7	193.2–214.6

* The lower figure for each year is based on a national per capita consumption (4.32 lb. in 1945 and 6.12 lb. in 1948) while the higher figure is adjusted to the greater per capita income of the West (5.13 lb. in 1945 and 7.27 lb. in 1948). It is assumed that the California tire manufacturing industry did not expand.

enter into the factors governing the selection of a rayon plant site. In 1939 the rayon industry generated 83 percent of its power requirements and purchased 17 percent. The spinning of rayon yarn is a continuous operation for which motive power must be supplied without interruption.

Adequate railroad or tidewater connections are sought for a plant site, for freight rates of raw materials to the plant and of manufactured yarn to market are of some importance.

Until fairly recently, normal textile markets were in the eastern and southern states. All rayon plants are now located in the East reasonably close to the textile mills which first processed the rayon filament yarn and staple fiber. In 1946, about 36 percent of the non-tire filament yarn was shipped to New England and Metropolitan New York, 46 percent to southeastern mills and 18 percent to Pennsylvania, Ohio and the Midwest. At the same time about 65 percent of the shipments of tire filament yarn went to fabric and cord plants in the southeastern states, 5 percent to New England and Metropolitan New York and 29 percent to plants in Pennsylvania, Ohio and the Midwest.

What the West offers

Now, what has the West to offer the rayon industry? The Pacific Northwest has the basic rayon raw material, cellulose, and water in abundance. In 1947 Rayonier, Inc., (with three pulp mills in Washington and one in Florida) and British Columbia Pulp & Paper Co. (with two mills in British Columbia) had a total capacity in the Pacific Northwest of 1,140 tons per day of dissolving-grade pulp—343,500 tons per 300-day year. Not counting any capacity increases since then, the Coast may have produced 79 percent of the wood pulp used by the rayon industry in 1948. Expressed another way, the Pacific Northwest's existing capacity to produce dissolving-grade wood pulp would support the manufacture of approximately 550,000,000 lb. annually of viscose rayon or 73.8 percent of the national production in 1948. Or it would support the manufacture of about 950,000,000 lb. of acetate rayon annually—more than 2½ times the 1948 national output.

Pulp output to go up

The Northwest's capacity to produce dissolving-grade pulp is to be increased by three mills under construction: the Celanese Corp. of America's mill at Prince Rupert, B. C., (initial capacity 200 tons per day); the mill of Ketchikan Pulp & Paper Co. at Ketchikan, Alaska, with an initial capacity of 300 tons per day; and the Sitka, Alaska, mill of Alaska Industrial Corp. with a planned capacity of 150 tons per day by 1951. This expansion will add 650 tons per day or 195,000 tons per 300-day year to the Northwest's capacity for dissolving-grade wood pulp. In addition, Arizona, California and New Mexico produce the alternate source of rayon cellulose—cotton linters.

Rainfall in the Pacific Northwest ranges up to over 100 in. per year; this guarantees abundant water supplies to industry, particularly those locating west of the Cascade mountains.

All chemicals required for manufacture of rayon by present commercial processes are manufactured in the West. And we have excellent plant sites with rail connections and/or on tidewater for possible competing water transportation.

The growing western population should guarantee an adequate labor supply and also add to the textile markets. The present population of over 17,000,000 was reached nearly four years earlier than predicted by the U. S. Bureau of Agricultural Economics. The rayon industry uses almost 50 percent women in its labor force, particularly in converting, throwing, knitting and weaving. Here in the West, sites might be chosen near the pulp mill towns where the men are working but the women are not.

It seems reasonable

With rayon producers hard-pressed to expand fast enough to keep in step with consumer demands (and still importing 31,000,000 lb. of rayon in 1948 to satisfy domestic consumption), it seems reasonable that a rayon plant in the Pacific Northwest could prosper. This is assuming that coastwise shipping, which already carries the wood pulp to eastern markets, would bring freight rates down to competitive levels. In other words, the Northwest plant could ship rayon yarn by water to Gulf and Atlantic ports.

Now, however with our own apparel and textile industry in California already worth over $400 million annually and with the Los Angeles tire manufacturing industry second only to Akron, our proposed Pacific Northwest rayon plant might take the western market and save the shipping costs to eastern markets.

Rayon has two big markets

Except for the abnormal uses created by war demands, markets for rayon fall into two general classes: (1) textiles and (2) cord and fabric for automobile and airplane tires. The use of viscose rayon in automobile tires reached commercial proportions in 1936. The reported consumption of 250,000,000 lb. in tire cord and fabric in 1948 indicates that wartime practice has been adopted industry-wide.

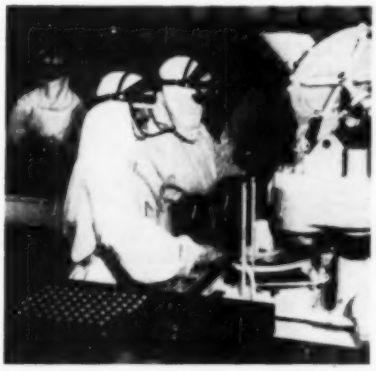
Textiles, on the other hand, are dependent upon per capita consumption. Rayon has risen from 2.4 lb. per capita per year in 1937 to 6.12 lb. in 1948. It is logical to assume that the western textile market would reflect the area's better-than-national average income. Per capita consumption of rayon in the West for 1948 is estimated at 7.27 lb. This would place the total western textile market at about 125,000,000 lb.

Calculations, verified by several approaches, show that the potential 1945 western market for rayon must have been between 151.2 and 164.7 million pounds, of which only between 115.3 and 128.8 million pounds was actually satisfied. This left a 35.6-million pound market in tires for which rayon could not be secured and therefore cotton substituted.

Here is the market summary

The 1948 potential market for rayon in the West has been calculated, assuming that the California tire manufacturing industry has not expanded since 1945. It is estimated to have been between 193.2 and 214.6 million pounds.

Two of the world's biggest rayon producers, American Viscose Corp. and Celanese Corp. of America, have taken steps to guarantee their pulp supplies in the Pacific Northwest by building pulp mills in Alaska and at Prince Rupert, B. C. Who will build our first western rayon plant?



Pharmaceuticals and Biologicals

WEST HAS—
Good climate (less heating, more worker output).
Substantial market.
Cheap fuel, power and water.

WEST NEEDS—
Lower wage rates.
Lower freight rates to eastern markets.
Local sources of some materials and supplies.

T. ROBERT SANDBERG, Works Manager
Cutter Laboratories, Berkeley, Calif.

Pharmaceutical and biological manufacture on the West Coast represents a mixture of advantages and disadvantages. As every good Californian testifies, the weather comes in for a fair share of praise. And in this industry the weather is important!

The climate counts here

It is important because essential building construction, due to the mild climate, may be somewhat simpler than in the East. In normal winter weather, substantially less heating facilities are required. Also, an important factor in biological production is the equitable summer weather which allows animal testing to go on uninterrupted. As all products must be tested, animals are consistently used. Heat prostration among them has added to eastern production problems. To combat this, expensive air conditioning units have in some cases been installed in the animal quarters. The Coast's cooler summer weather is conducive to greater performance by employees and makes working conditions more attractive. Even the equitable winters in California work to the animals' advantage—horses used for serum anti-toxin are always kept in top form by allowing them to run in the pastures instead of being confined to box stalls during the coldest months.

The western industry is definitely at an advantage in regard to the cost of fuel, power and water. The industrial power rates in the San Francisco Bay area are among the lowest in the nation. There is a plentiful power supply; it is always dependable due to the 71 plants (either steam or hydro) that feed electric energy to industry. Electricity plays an important part in biological production either for the refrigerators, incubators, or for specific needs such as for powering the machinery for making penicillin or blood fractions.

The fuel most commonly used in California is natural gas. Not only are gas rates in California among the lowest in the nation, but natural gas provides fuel at the lowest cost per Btu. There are no handling, storage or additional labor costs. Most large industries using gas in this area operate on the surplus rate. This is granted to an industry which will, on order from the gas company, change over to oil during periods of short gas supply. This is sometimes necessary during the coldest winter days.

Three scores for water

Water rates in the Bay Area are higher than in the East but this is offset by three factors important to the biological business: (1) the water is soft; (2) it is 100 percent filtered and therefore always safe; (3) there is plenty of it and the sources are reliable.

On the disadvantage side, two factors stand out—labor rates and freight rates. Labor costs are higher on the West Coast; labor rates are about 16 percent above those of eastern competitors.

Freight and transportation costs to eastern markets have forged ahead 49 percent since 1941. Railroad and trucking concerns maintain that their price increases are due to the higher cost of replacing rolling stock, increased wages and inflated federal taxes—all passed on to the consumer.

On the other hand, selling prices in the

WHERE ONE PACIFIC COAST PHARMACEUTICAL MANUFACTURER GETS HIS SUPPLIES

Chemicals	West	East
Mineral acids	X	—
Caustic soda	X	—
Lactose	X	—
Corn products	—	X
Organic solvents	X	X
Filter aids	X	—
Glassware		
Large containers	X	—
Small bottles	X	X
Glass tubing	—	X
Laboratory glassware	—	X
Miscellaneous		
Rubber stoppers & tubing	—	X
Packaging components	X	—
Plastic parts	X	—
Basic plastics materials	—	X
Laboratory equipment	—	X

pharmaceutical and biological field, in spite of high wage rates and increased raw material costs, have only gone up 35 percent. Penicillin is an example of tremendous decrease in selling price: only 2 percent of what it was to the medical profession in 1943. Trucking concerns and railroads are now petitioning for more increases, so perhaps lower freight rates would rank tops among the needs of western industries in order to compete in the eastern markets.

The Pacific Coast has been at a disadvantage in getting raw materials and supplies for pharmaceutical and biological manufacture. Extensive distances from prime suppliers has caused delayed deliveries and higher costs. Now, however, many of the difficulties of procurement are disappearing as more and more items are being made on the Coast. The origin of our chief raw materials and supplies are noted in the accompanying table. It should be pointed out that western firms are now working toward the production of rubber stocks completely satisfactory for pharmaceutical needs; so far, they have not been completely successful.

Insecticides

WEST HAS—

A big market (about 40 percent of U.S. total).

A fairly well balanced old-line insecticide industry.

WEST NEEDS—

A better balanced new-line (organic) insecticide industry.

Lower wage scales.

A larger and less seasonal market.

Better freight rates and concessions.

GEORGE S. WHEATON Vice President, Eston Chemicals, Inc., Los Angeles, Calif.

Probably over 40 percent of all the insecticides consumed in the United States are used in the West. The entire nation is called on to fill this enormous need for insecticides and their carriers, although within the western states there is a growing insecticide manufacturing business.

For many years there were a number of standard insecticides and a very substantial manufacturing business in the West was built up around them. Let us review some of the important ones.

Arsenicals, which ran into millions of pounds a year, were made by several concerns. The demand has now dropped off to a point where there are only one or two western manufacturers. They have been largely replaced by DDT and other organic insecticides.

Sulphurs are still big

The sulphurs still hold a very large market. They are ground by four or five concerns; the quantity runs into several thousand tons annually. There is a small output of elemental sulphur on the Coast, but most of it has to be brought in from Texas. Sulphur has held its own as a straight dusting compound and as a mixture with DDT and other organics. It is also used in lime-sulphur solutions which were once consumed in large quantities; their use is now decreasing in favor of newer organics. There were formerly eight or ten producers of lime-sulphur; now there are less than half that number.

Metallic compounds, of which Bordeaux mixture ran into large quantities, are being replaced by the less soluble coppers such as oxychloride, oxide, basic sulphate and hydrosulphate. There is only one manufacturer of these less soluble coppers on the Coast.

Oil sprays are bigger

Petroleum sprays are used as insecticides and herbicides. This is a well integrated business which gets its raw materials locally; western requirements are made almost entirely on the Coast. More of these sprays are used than all other insecticides put together.

Pyrethrum has been used principally as a household spray, but its use in agriculture has increased in the last year or two. Rotenone, largely replaced by DDT, staged a come-back in the Pacific Northwest this season. Nicotine sulphate, once with a wide market, has been encroached upon by tetraethyl pyrophosphate and parathion. There are no processors of the botanicals in the West.

DDT is the principal insecticide among the chlorinated hydrocarbons. We have no way of knowing the poundage used throughout the West. But it is interesting that two manufacturers have set up very substantial production and yet many carloads of the material cross the country from midwestern and eastern plants. One of the producers also makes benzene hexachloride; demand for this has been huge and substantial quantities are brought in from the East. One of the two manufacturers of chlordane is in the West.

Organic phosphates show promise

Of the miscellaneous organic insecticides, the dinitro compounds are used to some extent throughout this area but are not manufactured here. During the last few years the organic phosphates have proved to be extremely potent insecticides. During the 1947 season, hexaethyl tetraphosphate was first used extensively in agriculture; it was promptly replaced by its close associate, tetraethyl pyrophosphate, during the 1948 season. There are two manufacturers of this item on the Coast. The other organic phosphate of major importance is parathion, which is now going through its first large commercial season. There is one producer of this rather complex chemical on the Coast.

The field of fumigants is broad. HCN—the old standby—is made by two producers on the Coast that take care of most of the local market. Some of the uses of HCN have been encroached upon by newer chemicals such as methyl bromide, a fumigant for soil and stored fruits and grains. There is one producer of this bromide on the West Coast; all raw materials going into it are made locally. Ethylene dibromide is another new fumigant which is used for soil treatment and stored grain. There is one producer of this chemical in the West; a considerable quantity is also brought in from the East. As with methyl bromide, the raw materials come from local sources. Dichloropropene—dichloropropane is made here in substantial quantities as a soil fumigant. There is one producer of carbon bisulphide, another old standby in the area.

Clays come from the South

Many insecticides, either as dusts or wettable powders, must be mixed with diluents; the tonnage of these is large. A number of diluents for dusting purposes are mined in the West. But the clays used to make wettable powders that will remain in suspension in water with the insecticides still come from Georgia and other southern states.

Thus we see that those insecticides used prior to the advent of the new synthetics were generally prepared locally. This, a development over a period of years, was encouraged by nearby sources of raw materials and close proximity to users. There is little reason to anticipate a change in the status of such insecticides as the oil sprays, sulphurs and botanicals. As the demand increases for the new metallics, there is no reason why they cannot be made in the West.

But a different condition exists with the new synthetic organic insecticides. DDT is an example. During the war, no plants were built on the West Coast since WPB felt that the available chlorine was needed for other purposes and there was no western supply of monochlorobenzene. Since the war, due to the huge demand for DDT in the western states, two of the chlorine producers have built facilities for large production. This is an excellent case because there are no patents restricting the manufacture of DDT and the raw materials can be obtained in the western area. As one of these plants is in the north and the other in the south, they have a freight advantage by being located near their markets.

There are a number of reasons why more of the new synthetic insecticides are not manufactured here. They can be pretty well summarized as follows:

Wage rates are too high

1. The metropolitan areas of Los Angeles, San Francisco and Seattle still carry on the war-swollen wage rates which are among the highest in the country; this places manufacturers at a cost disadvantage.

2. In such chemicals as DDT, benzene hexachloride, methyl bromide, ethylene dibromide, D-D and a few others, the raw materials are available from West Coast sources. But these raw materials are not, in all instances, the lowest cost in the country. The freight advantage of location is often offset by the higher cost of recovering the raw materials.

3. With the exception of some export business, the manufacturer on the Coast must depend almost entirely on the needs of the 11 Western States. Midwestern and eastern manufacturers can adjust their activities to the varied seasons of the balance of the United States as well as the West. In other words, the local market is often not large enough to justify steady production, and when it is large enough it is often too highly seasonal to be attractive from the standpoint of a large capital investment.

4. There are two or three locations on the West Coast where low-cost power is available on a comparable basis to that at Niagara Falls and some of the large power projects throughout the East. Unfortunately, these areas are removed from the main points of distribution by quite a distance. In at least two cases they are far away from the principal metropolitan centers; this increases the expense of getting supplies and makes it rather difficult to get good labor.

Where's the logic in freight rates?

5. The western manufacturer works at a considerable freight disadvantage as compared to his eastern and midwestern competitors. For instance, finished insecticides carry a considerably lower freight rate than the intermediates or raw materials going into them. In some cases these materials carry twice the freight rate of the finished insecticide.

Another factor of major importance is that a carload coming in from the East may be stopped three times prior to final unloading; this means that a car may be stopped at Salt Lake City, Seattle and San Francisco, and finally unloaded at Los Angeles to give the shipper the advantage of l.c.l. shipments to all four points at the carload rate. The western manufacturer shipping within the western territory is allowed only one stopover for unloading in the immediate vicinity of the final destination; the same applies to shipments going to the Midwest and East. Such freight concessions greatly reduce the advantage the western manufacturer has by being near to his markets.

Problem: waste disposal

6. Another item among the problems of the western manufacturer is that of waste disposal. In California, Arizona, New Mexico and Nevada where water is at a premium, effluent from factories must be treated so that it will not contaminate any underground waters. This is getting to be a problem throughout the whole country; it has already arrived in California.

7. Finally, the California producer must recognize that the state is no longer an area of low-cost natural gas. The large volume of natural gas

now being brought in from Texas costs several times more in California as a fuel or as a raw material than in Texas.

These disadvantages may sound formidable to anyone considering manufacturing insecticides in the western United States. It is merely a listing of some of the problems and a part explanation of why there are not more insecticide producing plants in the area. Yet there are many very excellent reasons for establishing plants in the West. This has been done and will continue to be done to the great advantage of western suppliers of raw materials and for the better service that can be given to users from nearby sources of supply.

Synthetic Detergents

WEST HAS—
Self-sufficient synthetic detergent industry.
Petrochemical raw materials.
A national market.
New and growing markets (fruits, vegetables, textiles, pulp, paper).

WEST NEEDS—
More blenders and distributors in Northwest.

R. D. BRIGHT
Supervisor of Technical Service, Oronite Chemical Co., San Francisco, Calif.

Within the last three years the West Coast has become self-sufficient in the manufacture of synthetic detergents; it is now shipping large quantities of detergent raw materials to the East. Sulphonation stock for the alkyl aryl sodium sulphonate type detergents is being sold as "Alkane" by Oronite Chemical Co. The recent inauguration of bulk ocean shipments of this sulphonation stock to the New Orleans and New York port areas should solidify the West's role as a major petrochemical raw material supplier.

More alkane stock

Alkane is a liquid mixture of phenyl-substituted alkanes which can be readily sulphonated by means of fuming sulphuric acid, sulphur trioxide, or even 100 percent sulphuric acid. A new plant to produce this material in greatly increased volume was recently put on stream at Richmond, Calif. Additional plant expansions are either under development or construction. The tremendous manufacturing potential for Alkane and the establishment of the large-scale market assures detergent manufacturers a uniform, practically unlimited source of raw material at an attractive price. Savings from the increasing scale of production have been passed on to customers; this trend seems likely to continue.

Household detergent products are going successes on the Pacific Coast. An outstanding example is in the Los Angeles area where, in the first half of this year, 54 percent of the combined total packaged soap and detergent products were based on detergents. Spray dryers for synthetic detergents are located in the San Francisco, Los Angeles and San Diego areas. These supply the needs of the major soap manufacturers, who have incorporated both light and heavy duty detergents as regular items in their lines. Many other firms specializing in repackaging, compounding, or dry blending of flake or powdered detergents are also distributing in the major West Coast marketing areas. Numerous Coast concerns manufacture special dry and paste cleansers and cleaning compounds containing a detergent as the active ingredient.

New markets in agriculture

New agricultural applications—the washing of fruits and vegetables for the fresh produce markets and the peeling of fruits such as peaches and apricots for canning—are drawing attention of the western food processors to detergents. The growing West Coast textile industry also should be turning to locally-made detergents for wet processing operations.

The Pacific Northwest offers opportunity for new detergent blenders and distributors. The use of detergents with superior wetting characteristics is growing in the pulp and paper industry. Various mining flotation uses where the superior foaming characteristics are important show considerable promise. The use of detergents for applying agricultural sprays as well as for removing residual spray materials from fruits or vegetables can be expected to increase materially in the Pacific Northwest. The fishing industry is finding detergents useful in many phases of its activity; these include the washing of nets and equipment and general clean-up operations on boats and in the canneries.

Detergents in California

In California, detergents have found many agricultural and industrial uses. The food processing industry has found marketing and processing advantages in the washing and peeling of fruits and vegetables. The building materials industry has found that small amounts of detergent in cement, gypsum wall board and concrete blocks give easier manufacturing operations and more uniform products. Techniques for the use of detergents in the oil and allied industries, such as for petroleum recovery and emulsion-breaking, are being developed. Detergents have also been put to work as wetting agents in insecticide dusts and as emulsifiers in a wide variety of fungicidal and insecticidal sprays.

Consumer acceptance of detergent products has been marked not only in hard water areas

where innate superiority over soap is more obvious, but also in soft water areas where such properties as quick solution rate, more complete rinsibility, and better grease removal are outstanding advantages. From a standpoint of economics, the tremendous potential of the petrochemical supplier offers stability to the price structure for detergent materials. The long-term price trend on detergents from petroleum is gradually downward.

New products are coming

Oronite Chemical Co., in cooperation with California Research Corp., is developing new detergent products in both the anionic and non-ionic categories. Remarkable performance of synthetic laboratory products in cotton and wool detergency ratings, wetting characteristics and other important factors, suggests that the position of the West Coast in the surface-active manufacturing field will continue to grow. The possibility of selecting a greater number of varied raw materials available in quantity at low price is an attractive prospect for the future.

Oronite is also developing for the low-cost volume market new cationic surface-active materials of the quaternary ammonium type. These are powerful germicides and will play an important role in the expanding health programs being initiated by federal, state, county and local governments. Their use in detergent sanitizers with non-ionic type detergents will be of material benefit in disease control. These quaternaries are derivatives of petroleum chemicals and again present the prospects of lowered costs and greater availability as a result of the technical developments of the West Coast petrochemical industry.

Non-Metallic Minerals

WEST HAS—
More commercial minerals than any other like area in the world.
A stabilized salines industry.

WEST NEEDS—
Larger industrial markets.
Closer markets.
More interest and study by mining engineers.

HENRY H. SYMONS Statistician, California Division of Mines, San Francisco, Calif.

The states in the Rocky Mountains and those west of the Rockies are rich in non-metallic mineral deposits. Exploitation of western minerals was, in the early days, entirely for the metals and very little attention was given to the non-metallic minerals. These were mined by the early settlers for local building construction.

But by 1880, California minerals which now play an important role in the chemical industry were being produced: petroleum, natural gas, coal, borax, salt, limestone and clay. California has a greater number of possible commercial minerals than any state in the union or any like area in the world.

Why progress has been slow

Development of these deposits has been slow for many reasons. Industrial demand for them has been small since large manufacturers using them were largely located in the East close to centers of population and markets. Most non-metallic minerals are widely distributed and low priced; therefore they cannot stand a high transportation cost. Many of the best of these deposits are located in inaccessible places and

CALIFORNIA'S TONNAGE OUTPUT OF CERTAIN MINERAL MATERIALS

	Magnesium Salts	Salt	Soda Ash & Salt Cake	Borates (40% ABA)	Dolomite	Industrial Limestone
1937	3,867	370,431	153,685	326,099	12,371	351,755
1938	24,176	395,746	178,105	276,144	4,363	302,665
1939	3,895	417,956	200,049	244,819	17,791	316,029
1940	4,325	462,282	228,108	212,358	18,178	563,999
1941	6,352	434,237	179,210	224,986	22,300	459,153
1942	6,260	672,324	267,723	203,716	142,552	474,764
1943	9,026	631,776	260,590	216,687	331,251	493,262
1944	113,927	709,873	299,574	234,960	217,018	734,425
1945	54,595	734,736	311,236	257,299	464,633	532,408
1946	55,953	796,761	392,015	332,157		767,170
1947	40,000	768,397	479,921	501,935	298,138	

WESTERN PROCESS INDUSTRY GROWTH*

	Production Workers (1,000)		Value Added by Mfg. ($1,000,000)	
	1939	1947	1939	1947
Pacific Coast States				
Textile mill products	6.8	7.8	$21.5	$48.6
Paper & allied products	16.6	25.6	71.4	233.0
Chemicals & allied	10.9	21.3	83.9	307.5
Petroleum & coal products	9.6	17.6	99.4	217.9
Leather & leather products	2.8	5.6	9.6	28.6
Stone, clay & glass	13.1	27.8	54.7	177.6
Mountain States				
Textile mill products	0.5	0.6	$0.7	$1.6
Paper & allied products	0.2	0.7	0.8	4.8
Chemicals & allied	1.3	3.7	8.9	40.2
Petroleum & coal products	2.4	4.3	19.9	51.8
Leather & leather products	0.4	1.1	1.1	4.8
Stone, clay & glass	3.1	5.5	10.7	32.1
Total	67.9	121.8	$368.7	$1,108.5

* From preliminary reports of the Bureau of the Census. Includes the 11 Western States. Production workers are average for the year.

have not been prospected thoroughly. The demand was often small and in some cases from one to two carloads a year would satisfy the local market. This would not justify equipment for economic mining. Few western miners or engineers have shown much interest in non-metallic minerals; nor do any of our mining schools offer courses to encourage mining them.

But in recent years, western non-metallic deposits have become more interesting to the nation's economy. Many deposits near industrial centers in the eastern states are being worked out. In others, the grade is not as high as that worked in previous years and specifications have to be adjusted to meet materials available or other deposits found. More and more minerals are being used in new products. Finally, many industries are moving west to supply the needs of a growing population. Large manufacturers have been purchasing non-metallic deposits throughout the West for many years for use when their present supplies are exhausted or when they will expand westward.

In general, the tonnage output and number of non-metallic minerals produced in California and other western states can be compared directly to the growth of the chemical industries in the West.

Salines are important

The saline minerals are among the most important of the non-metallics produced in the West; all are of vital importance to the chemical industry of the nation. Borax was first produced commercially in California in 1864. By 1900 California was the world's chief source of boron minerals; the trend each year has been for a larger production. The 1947 borax production was 501,935 tons.

Bromine was first produced in California in 1926 from bittern-waters of salt works near San Diego; since then the output has shown a constant increase. Average bromine output over the past ten years is over 1,000 tons a year.

Water from oil wells in the Venice, Compton and Torrance fields are used to obtain iodine. The average production is approximately 600,000 lb. a year. California is the only producing state in the nation. Average output of calcium chloride in the state is about 5,000 tons a year.

Magnesium compounds other than the chloride have been produced commercially in California since 1929. There has been a marked increase in the number as well as quantity of magnesium compounds. The 1947 output was 40,000 tons.

Potash output goes up

Potash has been produced chiefly from brines of a lake bed in San Bernardino County. The output has been showing a steady increase. An annual average for the last ten years has been better than 175,000 tons. The 1947 salt production was 768,397 short tons. The 1947 output of soda ash and trona totaled 293,057 net tons.

Coal has been of little importance as a fuel in California. But in recent years it has been found that coal from Ione, Amador County, was rich in montan wax. A plant has been constructed and the wax is now on the market. The residue after the wax has been extracted has little fuel value but has been found to be a good soil conditioner.

Barite, mined in the state since 1910, has been used in the manufacture of barium chemicals and pigments. The average production in California is approximately 30,000 tons annually over the past ten years.

Bentonite production has varied from 5,000 to 25,000 tons a year. Natural carbon dioxide output has reached over 200,000 M cu. ft. a year; it is used mostly for making dry ice.

Diatomite mined in California has been the nation's chief source of this material. The state's production has averaged over 125,000 tons a year for the last ten years.

Dolomite has been mined in California since 1915 but not until 1942 did the production reach any importance. In that year this mineral was used in the process of producing magnesium from sea water. The annual production now runs over 225,000 tons a year.

In 1938 the state became the chief source of the nation's lithium compounds. These are recovered as a byproduct in the refining of potash, borax, and soda from Searles Lake. The output averages about 500 tons a year.

Natural gas is second in importance in value of all mineral substances produced in California; the 1947 output was over 540,000,000 M cu. ft. The gas comes from the oil fields of Southern California and the San Joaquin Valley and from the gas fields of the central part of the state.

Petroleum is number one

Petroleum is the most important mineral in the state. In 1947 the production was 333,102,000 bbl. California's crude oil output is second to that of Texas. The oil fields are located in the southern part of the San Joaquin Valley, in Fresno, Kings, and Kern counties; the Los Angeles basin in the Los Angeles and Orange counties; and in the coastal area of San Luis Obispo, Santa Barbara, Ventura, and Los Angeles counties.

Recent production of pyrite has been in excess of 100,000 tons a year. Sulphur deposits have been explored in Alpine and Inyo counties, but little production has been made. In 1947 the production of talc, pyrophyllite and soapstone totaled 91,537 net tons.

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"We installed your '1000' reducing valve in our re-capping set-up about six years ago and to this date we have had **trouble-free** service. Periodically I check steam **pressure** and find it to be very **accurate.** I wouldn't hesitate a minute in recommending your Streamlined Reducing Valve."

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3. **Trouble-free service.**
4. **Smooth operation.**
5. **Tight closure.**
6. **Speedier production results.**
7. **Elimination of failures.**
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9. **No spoilage.**
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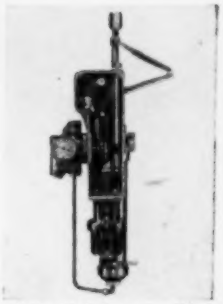
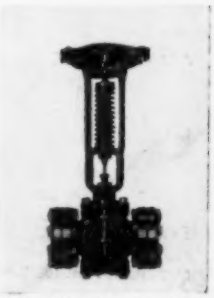


Bulletin 963 features the CASH STANDARD Type 100 Series of Super-Sensitive Controllers — various types for automatically operating valves, dampers, rheostats, stokers, pulverizers, fans, and other apparatus. 16 pages filled with descriptions and applications.



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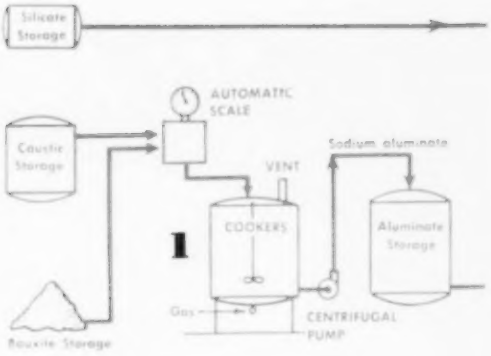
A CHEMICAL ENGINEERING PICTURED FLOWSHEET



Synthetic Zeolite

Article on page 92

This flowsheet shows how synthetic zeolite is made by the nation's biggest producer, Culligan Zeolite Co., San Bernardino, Calif. An article on the plant appears on pages 92-93. It's capacity is about 25 million lb. of synthetic zeolite a year.

Zeolite is a sodium-aluminum-silicate gel, having the formula $Na_2O{\cdot}Al_2O_3{\cdot}6SiO_2{\cdot}xH_2O$. It is produced synthetically by reacting caustic soda with bauxite to form sodium aluminate, then reacting the sodium aluminate with sodium silicate to form zeolite. After the zeolite is dried it is ready for screening, grinding, washing and packaging. Here is how Culligan does it.

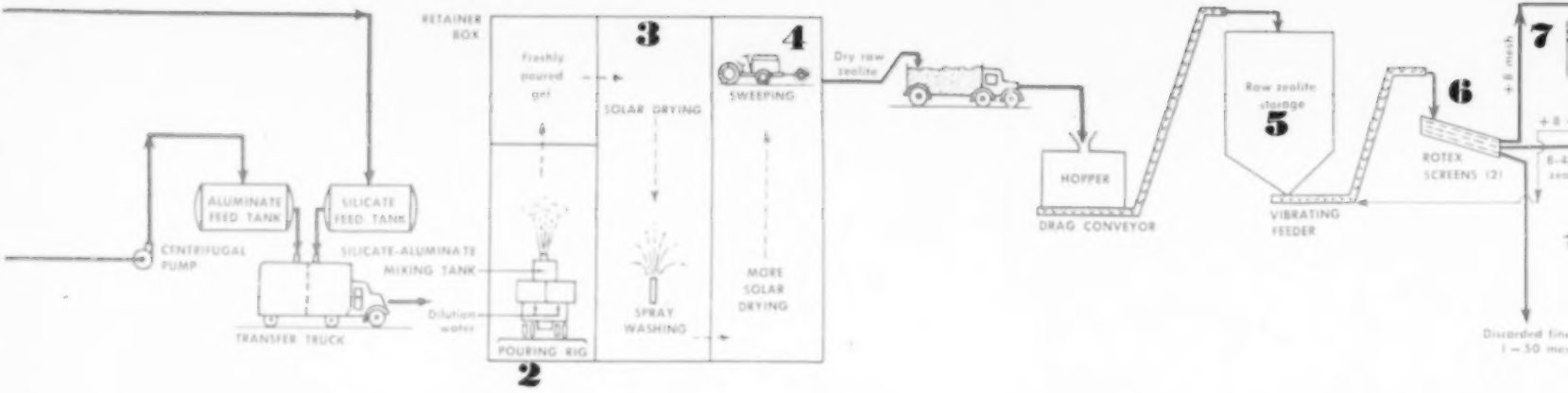
Caustic and bauxite are reacted in one of three cookers—6x6-ft., gas-fired steel vessels. After the 50 percent caustic solution has been run in and brought to a boil, the bauxite is added and the reaction continues at 245 deg. F. for about 45 min. The product, sodium aluminate, goes to a storage tank and in due time to one compartment of a two-compartment tank truck. Into the truck's other compartment they load 42 Be. sodium silicate, then drive out across the concrete drying beds to a pouring rig mounted on a second truck. The chemicals are pumped separately from one truck to the other; the rig proportions them, dilutes them (with water from a piping system through the drying beds), mixes them and pours the mixture out the back end into a rectangular steel frame on the ground (see photograph 2). The zeolite gel sets up in about a minute, the retaining frame is removed, and the rig moves ahead to the next spot.

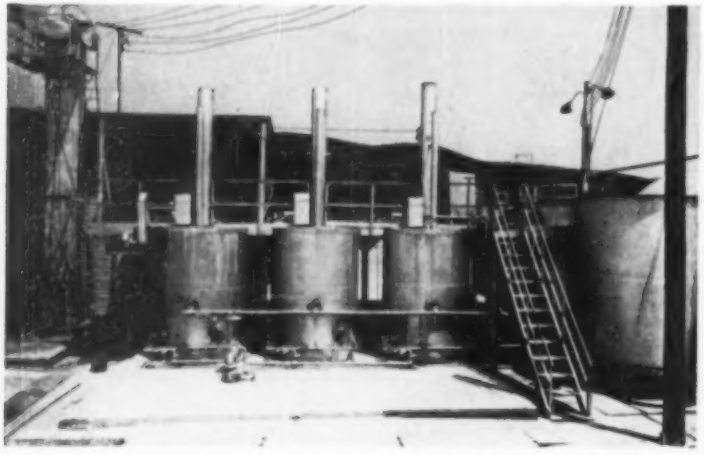
The zeolite slab is 6 in. thick and dries in 2-5 weeks, depending on the season. It is sprinkled with water when it is about a fourth of the way through the drying period; this washes out soluble salts and crackles up the zeolite to about the right screen size. When it is completely dry, the zeolite is swept into "windrows," scooped up into a dump truck and carried back to the mill house.

BIGGEST U. S. PLANT. These drying beds, and plant at far end, represent half of U. S. synthetic zeolite capacity.

The truck dumps it into a hopper; a dragveyor and elevator get it up into a storage bin; and a vibrating feeder plus another elevator deliver it to a screening system—3 double-deck screens and a two-high roll mill. The screens discard —50 mesh material and pass along the 8-50 mesh to a water-classifier which "sinks out" any sand picked up along the way. Next, soluble salts are removed from the slurry by water washing in four cone-bottom washers; the zeolite slurry moves down through the washer, countercurrent to the wash water, and is pumped out the bottom to three retaining tanks. Here the zeolite is dewatered; it settles to the bottom while water goes out through overflow boxes placed a little way above the bottom. The finished zeolite is weighed into burlap bags. Some of these bags go to Culligan's Northfield, Ill., plant to fill household service tanks; some go to commercial and industrial consumers; and some stay at San Bernardino to fill household service units.

CHEMICAL ENGINEERING • SEPTEMBER 1949 • PAGES 140-143

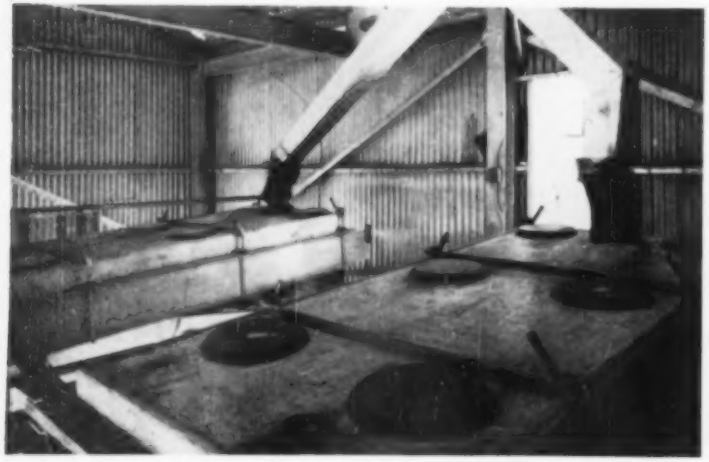




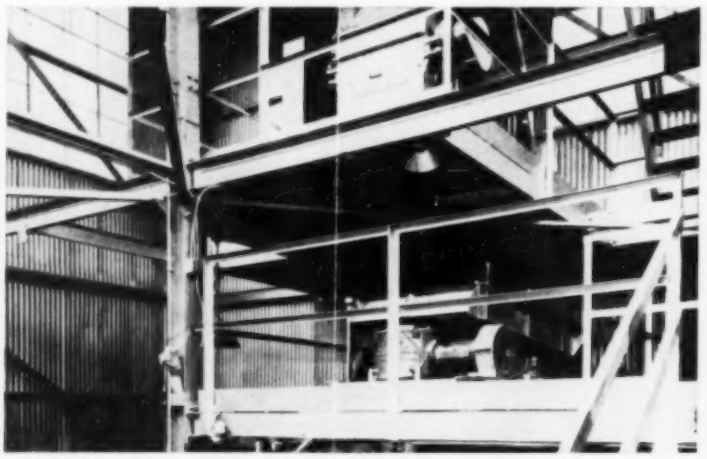
1 COOKING. First step on road to synthetic zeolite (Na_2O-Al_2O_3-$6SiO_2$-xH_2O) is reaction of caustic soda with bauxite to produce sodium aluminate solution.

2 POURING. Sodium aluminate and sodium silicate, brought from plant in tank truck, are mixed in rig, poured into frame on concrete drying bed.

3 CURING. Sodium alumi sun dries it, crackles it up

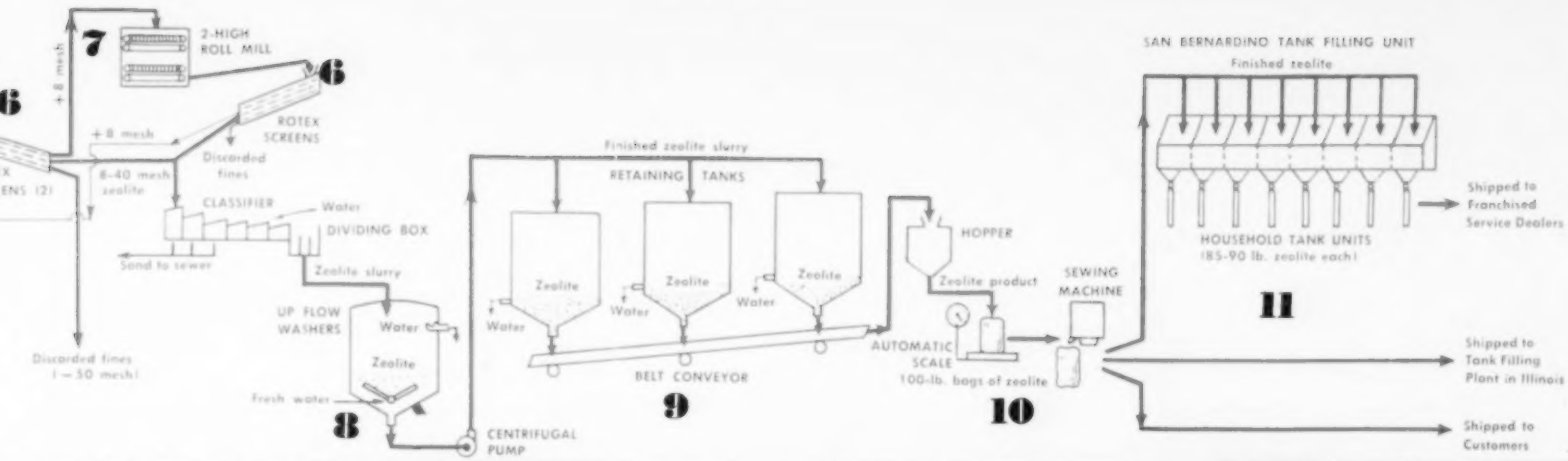


6 SCREENING. Screens are double-deck, 8 mesh over −50. Rubber balls between decks keep screens clean. Fines are discarded; coarse material goes to roll mill.



7 MILLING. Mill is two-high flour mill; rolls are steel, have Le Page corrugations. Mill is at top center; under it is the third screen in zeolite sizing system.

8 WASHERS remove so There are four of them

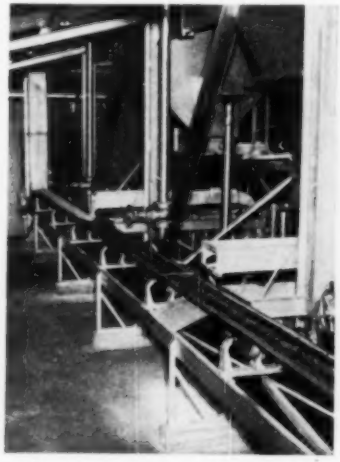


G. Sodium aluminate and silicate react to form solid cake of zeolite gel. Hot it, crackles it up to look like this.

4 HARVESTING. Power sweeper "windrows" the cured zeolite; scoop-mobile loads it into dump truck to be taken back to plant for finishing operations.

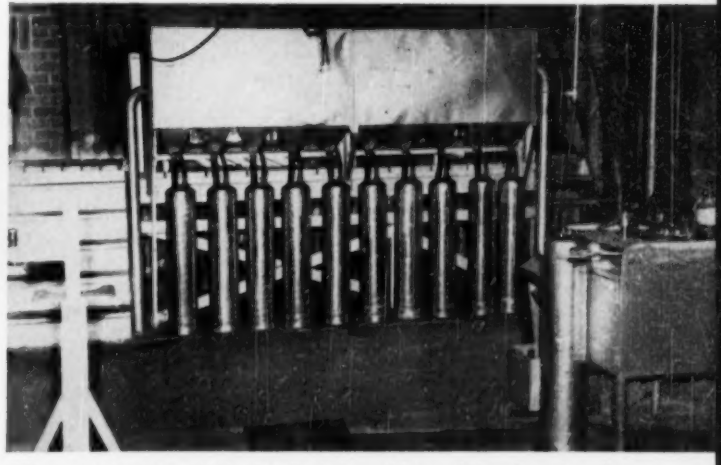
5 STORING. Bin holds 450,000 lb. of raw zeolite.

ERS remove soluble salts. re four of them in parallel.



9 FEEDING. Vibratory feeder measures zeolite onto belt.

10 BAGGING. Bags are weighed automatically, sewed with a rip cord.



11 TANK FILLING. 90 lb. of zeolite is dumped into each funnel; gravity pulls it into tank beneath. Tanks go into domestic water-softening units.

COST-REDUCING PERFORMANCE

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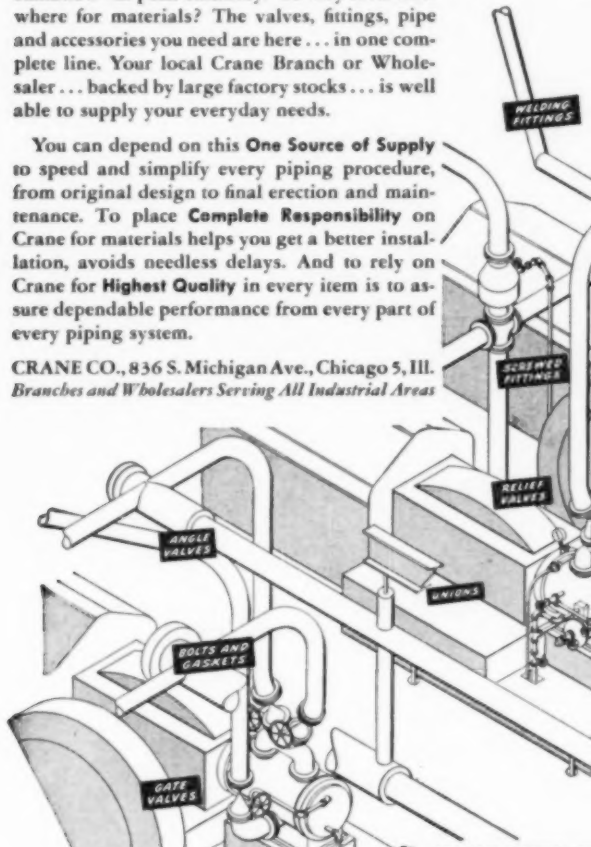

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Complete line includes
check patterns. No.
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ammonia. Screwed e
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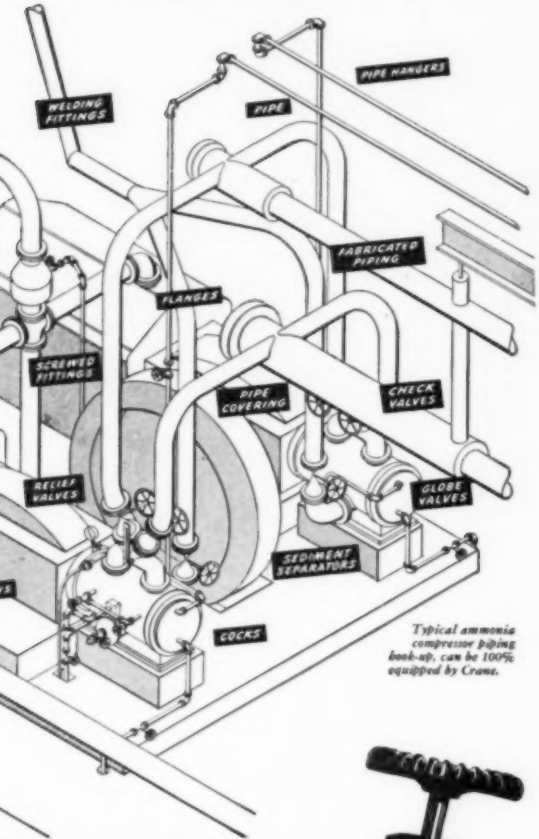

Typical ammonia compressor piping hook-up, can be 100% equipped by Crane.

SAFE CONTROL OF NOXIOUS GASES . . . *choose Crane y Duty All-Iron Valves with special lead disc-faces. plete line includes gate, globe, angle, expansion and patterns. No. 1504 Globe, shown here, especially mmended for high-pressure ammonia refrig- on service. Working pressure: 300 pounds onia. Screwed ends. Sizes up to 2 in. See Crane Catalog.*

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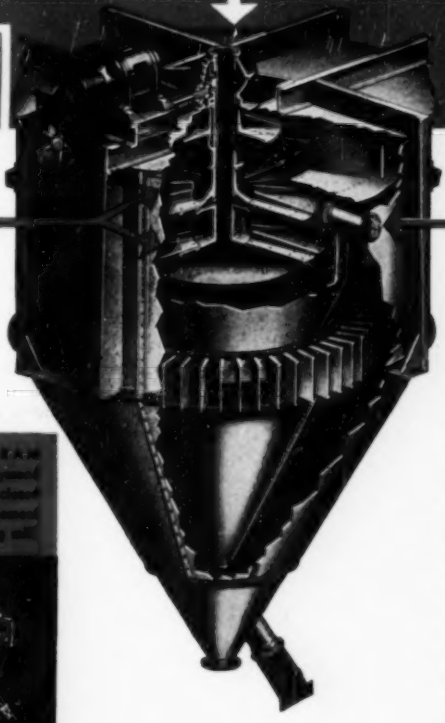
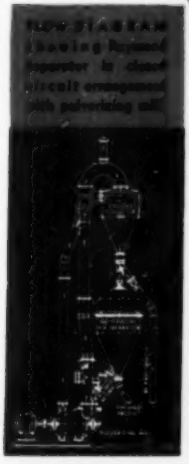




The Raymond Mechanical Air Separator finds wide application in the chemical, food, and process industries and, in fact, wherever high fineness and uniformity of finished product are required. The revolving whizzer principle permits closer, cleaner, faster separation of the material. Uniformity of the finished product is held within narrow limits. Increased capacities are obtained in the high fineness range with resulting lower tonnage costs.

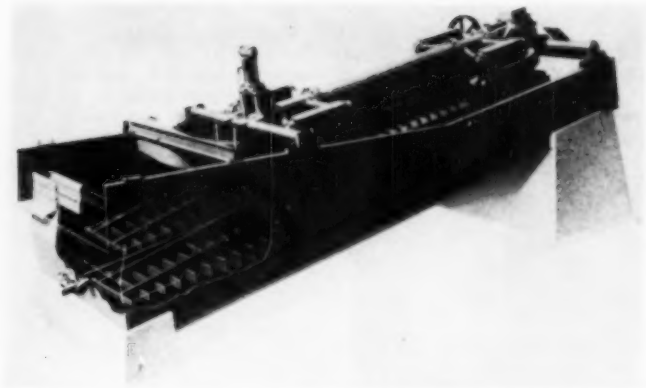
A few typical materials handled on Raymond Separators include talc, clay, dry chemicals, silica, dextrose, starch, sugar, cocoa, and a host of others. A wide range of fineness is obtainable, and several special Raymond Separators are now classifying materials and delivering the fines in the lower micron sizes.

Whether your problem is to produce an extremely fine end product, or to dedust a material to remove objectionable fines, you will find the Whizzer Type Mechanical Air Separator the answer to your needs.

COMBUSTION ENGINEERING—SUPERHEATER, INC.
RAYMOND PULVERIZER DIVISION
1311 North Branch Street, Chicago 22, Illinois

Process Equipment News

THEODORE R. OLIVE, *Associate Editor*



NEW DESIGN:

Improved Classifier

Type H is the designation of a new classifier incorporating a radically different head motion design and rake path, now being manufactured by the Dorr Co. The new design is said to offer many definite advantages over the earlier Type F which it now supplants in all types and sizes except the light duty and laboratory sizes. In the new type, the rakes, tank, feed launder and general tank arrangement are essentially the same as those of its predecessor, but the operating mechanism differs materially. It is simple and rugged, employing about 50 per cent less moving parts than comparable units of earlier design, and insures full harmonic motion with the rakes fully synchronized at all times, both horizontally and vertically. The balanced motion is said to reduce greatly both structural stresses and power losses.

In the duplex model illustrated, the rakes are supported at either end on sliding "crosshead" members carried on arms radiating from a central torque tube. A cam and roller action at the head end causes periodic oscillation of the torque tube, dropping the rake on one side and raising that on the other. Reciprocating motion of the rake, synchronized with the oscillation of the torque tube, is obtained by cranks at the head end. The path described by each rake is substantially a rectangle, except that the ends (raising and lowering) are slightly elliptical.

To provide for adjustment or lifting the rakes in case of an overload, a hydraulic cylinder near the feed end lifts that end of the torque tube, causing the entire drive assembly to pivot at the head end. A full 12-in. rake lift is thus instantly available under push-button control. The classifier is provided with oil-tight housings wherever necessary, with anti-friction bearings and with automatic lubrication where feasible. The entire drive mechanism is supported at three points only, so that the mechanism's alignment is independent of the alignment of the classifier tank. *The Dorr Co., 570 Lexington Ave., New York 22, N. Y.*

Marshall and Stevens Indexes of Comparative Equipment Costs

(1926 = 100)

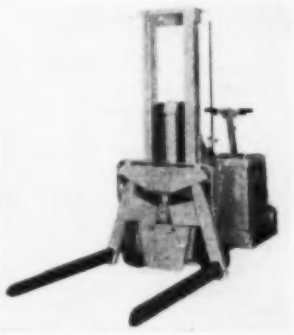
Compiled quarterly for March, June, September and December of each year by Marshall and Stevens, evaluation engineers, Chicago and Los Angeles. Indexes are prepared for 47 different industries, from which the eight process and four related industries listed here are selected. Published each month with the latest available revision. For a description of the method of obtaining the index numbers see R. W. Stevens, *Chemical Engineering*, Nov. 1947, pp. 124-6. For a listing of annual averages since 1913 see *Chemical Engineering*, Feb. 1949, p. 129.

Industry	June 1948	Mar. 1949	June 1949
Average of all	169.5	165.1	160.6
Process Industries			
Cement mfg.	153.9	159.5	155.9
Chemical	161.9	167.5	163.9
Clay products	148.9	154.5	150.9
Glass mfg.	152.0	157.6	154.0
Paint mfg.	155.2	160.8	157.2
Paper mfg.	155.5	161.1	157.5
Petroleum ind.	158.3	163.9	160.3
Rubber ind.	160.7	166.3	162.7
Process ind. avg.	159.2	164.9	161.4
Related Industries			
Elec. power equip.	163.5	169.1	165.5
Mining, milling	162.6	168.2	164.6
Refrigerating	173.3	181.2	174.8
Steam power	156.6	156.2	152.6

REDUCES NOISE:

Sound Snubber

To reduce the noise from engine exhausts and compressors and vacuum pumps to the noise level of the surrounding area, the Burgess-Manning Co., has developed the new "Slug Buster Snubber," an acoustic filter produced in ten different standard sizes. The manufacturer describes the operation as follows: Fast moving "slugs" of exhaust gas set up a pulsating flow within the exhaust pipe, building up a steep wave front which produces a continuous annoying roar on striking the atmosphere. The new device continuously snubs these slugs as the gas expands into each successive snubbing chamber, so that the exhaust gas emerges from the final stage in a relatively smooth and quiet stream. *Burgess-Manning Co., Libertyville, Ill.*



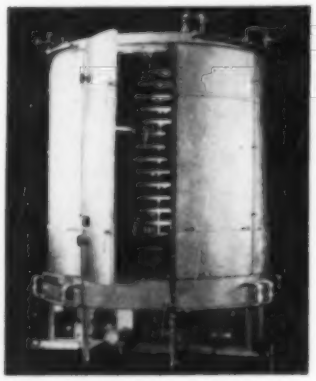
ADDS UTILITY:

Palletless Handler

Battery-operated hand trucks, such as the Yale & Towne Worksaver, are going the way of the operator-carrying fork trucks in adding many attachments for specialized applications. The Worksaver can now be equipped with hydraulically adjustable forks for palletless handling, designed to pick up the load by squeezing it in a pincer-like movement. This adaption is

(Continued)

known as the "Bunnyhugger." Another variation, known as the "roto Worksaver," applicable to non-tilting fork models, provides a revolving fork carriage which rotates a full 360 deg. to accomplish such tasks as emptying scrap bins, pouring ingredients for mixing or batching, charging materials into tanks, and so on. Containers for this purpose have short angle iron lugs welded to their sides to form a slot into which the forks fit. The rotating mechanism is operated by a lever in front of the truck mast. *Yale & Towne Mfg. Co., Philadelphia Division, Philadelphia, Pa.*



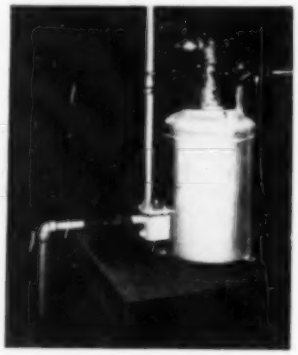
CONTINUOUS OPERATION:

Turbo Cooler

Based on a modification of its well-known Turbo Dryer, the Wyssmont Co. has introduced the Turbo Cooler, designed for continuous cooling of all kinds of granular and pulverized materials. As the illustration shows, the device is inclosed within a vertical cylindrical shell. Centrally located is a shaft carrying fans for circulating the cooling air. Outside the fans and concentric with them is a rotating structure carrying a large number of trays. Material is fed continuously to the top row of trays which, after one revolution, discharge the material to the next row down, turning it over and spreading it. This action continues until material has passed over each row of trays and is discharged at the bottom.

Cooling may be accomplished by circulating the air over cooling coils between the trays and the housing, or by use of an external heat exchanger. Room air is drawn in at the bottom and leaves at the top. Circumstances determine whether any of the leaving air is recirculated or whether all fresh air makeup should be used.

These coolers are produced in steel, aluminum or stainless steel for parts coming in contact with the material to be cooled. Trays can also be obtained in non-metallic materials such as Chemstone or Transite. Since there are only two rotating parts, it is claimed that maintenance and repairs are low. *The Wyssmont Co., 31–04 Northern Blvd., Long Island City 1, N. Y.*



FEW MOVING PARTS:

Pneumatic Pump

Self-priming, the new SK Ejectopump has no glands or bearings and operates on compressed air from 30 to 50 psi. It is said to handle many liquids of varying character and viscosity without aeration. It will pump liquids at temperatures up to 120 deg. F., or higher, depending on lift, employing a maximum suction lift of 25 ft., and discharge heads up to 55 ft.

Air is used to operate the pump, both on suction and discharge. A rhythmic cycle of suction and discharge is maintained automatically. An air-operated ejector in the pump head creates a vacuum to draw liquid into the case. When the pump case is nearly full the ejector shuts off and the air flow is diverted into the pump casing, which then acts as a blow case. Before the pump is entirely empty the cycle is repeated. *Schutte & Koerting Co., 12th & Thompson Sts., Philadelphia 22, Pa.*

SAVES VAPOR LOSSES:

Breather Balloon

Capacities from 1,000 up to 25,000 cu.ft. are available in a line of synthetic rubber breather balloons for volatile liquid storage tanks now being offered by the Vulcan Proofing Co. Work with such balloons was pioneered by the Standard Oil Co. of Indiana, which has been using this method of preventing loss of volatiles from petroleum product storage tanks for over ten years. A single balloon, constructed of synthetic rubber-coated fabric with high resistance to gasoline vapor diffusion, can serve a group of storage tanks, and requires only a simple housing which can usually be constructed of local materials. Normal tank breathing losses can be saved by venting the tanks to the balloon which stores the vapors during the day, returning them to the tank automatically as temperatures fall at night. Vapor displacement losses during tank filling are similarly vented to the balloon. It is claimed that this system not only conserves 3 to 4 per cent of the stored material which is normally lost in this fashion, but also prevents deterioration of quality through the evaporation of the lighter petroleum fractions. *Vulcan Proofing Co., First Ave. & 55th St., Brooklyn 20, N. Y.*

IMPROVED DESIGN:

Rock Salt Dissolver

Several improvements over the previous type have been incorporated in a new model Lixate rock salt dissolver by the International Salt Co. The new Sterling model Lixator is made of stainless steel and incorporates structural changes making it easier to use. The device consists of a storage hopper and a rock salt dissolving tank containing a salt filter bed and a brine collection chamber. Rock salt enters the dissolving tank from a hopper at the top. As salt dissolves, additional salt flows in to replace it. Water enters through a distributing nozzle at a point below the top of the tank, flowing downward and becoming saturated. The remaining salt in the tank then acts as a filter through which the

(Continued)

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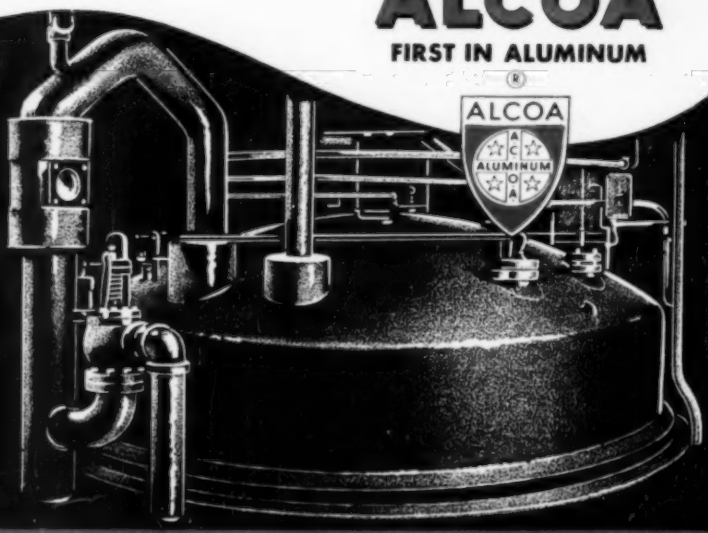

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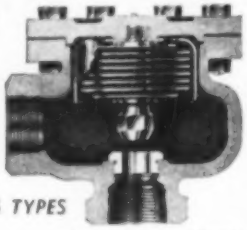

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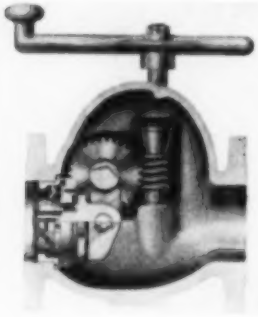
Repeated comparative tests show Nicholson traps operate on lowest temperature differential; stop waterlogging; increase production of kettles up to 30%. Eliminate "cold blow" in unit heaters. Size 1/4" to 2"; press. to 225 lbs.

BULLETIN 1047.

W. H. NICHOLSON & CO.
206 Oregon St., Wilkes-Barre, Pa.

saturated brine must pass. When brine reaches the body of the tank it is claimed all suspended matter has been trapped, producing a clear brine. Improvements have come through the use of 2-in. pipe legs which permit ready adaption of the height of the unit to other equipment; and through relocation of the water nozzle arrangements to facilitate periodic cleaning of the tank. *International Salt Co., Detroit, Mich.*



SEALS VOLATILE LIQUIDS:

Shut-Off Valve

Tork-Master Co. recently has announced its new MacBain positive shut-off valve which, although similar in appearance to a check valve, has its closure under control of a worm and gear operated from an external hand wheel to assure positive control in opening and closing. The arrangement is said to enable the valve to be opened easily against rated pressures. Use of a double seal disk and seat arrangement permits the valve to be throttled or closed without shock. The seals are of special synthetic rubber which are said to stay tight under extreme conditions ranging from −40 to +300 deg. F. With a straight-through flow, pressure loss is reduced to a minimum. Such valves are employed in handling a variety of petroleum industry products, including butane, various fuel oils, and hot wax. They are made in sizes from 2 to 4 in. for pressures from 150 to 300 lb. *Tork-Master Co., 1624 Seabright Ave., Long Beach 13, Calif.*

FOR HIGH PRESSURES:

New Reducing Valve

Atlas Valve Co. has developed an improved reducing valve for working at pressures as high as 6,000 psi. Known as Type E, the valve is suited to reducing the pressure of water, oil or compressed air in a single stage to 250 psi., or to within 20 percent of the initial pressure. For lower reduction, two stages should be used, employing this valve in conjunction with a valve suitable for working pressures up to 300 psi. The valve body is of forged steel with internal parts of hard chrome plated stainless. The valve uses a one-piece seat stem and removable seat which are easily reground and replaced. Special plastic cup washers are used, designed for high-pressure service. Since the pressure on the seat is balanced by a piston, variations in initial pressure are claimed to have very little effect on reduced pressure. Adjustments are readily made with a hand wheel at the top of the valve. *The Atlas Valve Co., 282 South St., Newark 2, N. J.*

PREVENTS SPLASH:

Safety Carboy Drainer

Wahlert Safety Products Corp. has developed a safety carboy drainer which prevents the possibility of splash in emptying carboys with a carboy tilter. The device provides an air vent which gives uninterrupted liquid flow, but prevents spilling and splashing. The vent and spout are of hard acid-proof rubber and the soft rubber neck is adaptable to a range of sizes of carboy. Three sizes are made for carboys varying from the 5 gal. size to the large 13 gal. size. *Wahlert Safety Products Corp., 25 Lafayette St., Brooklyn 1, N. Y.*

EASY BREATHING:

Filter Mask

Whipped foam latex is used as the filter medium in a new filter mask for non-toxic nuisance dusts developed by the Goggle Parts Co. The lightweight frame, molded of polyethylene plastic, can readily be fitted to the face to assure a leak-proof fit without discomfort. The foam filter, which can readily be washed and sterilized, for use over and over again, is said to be effective in separating

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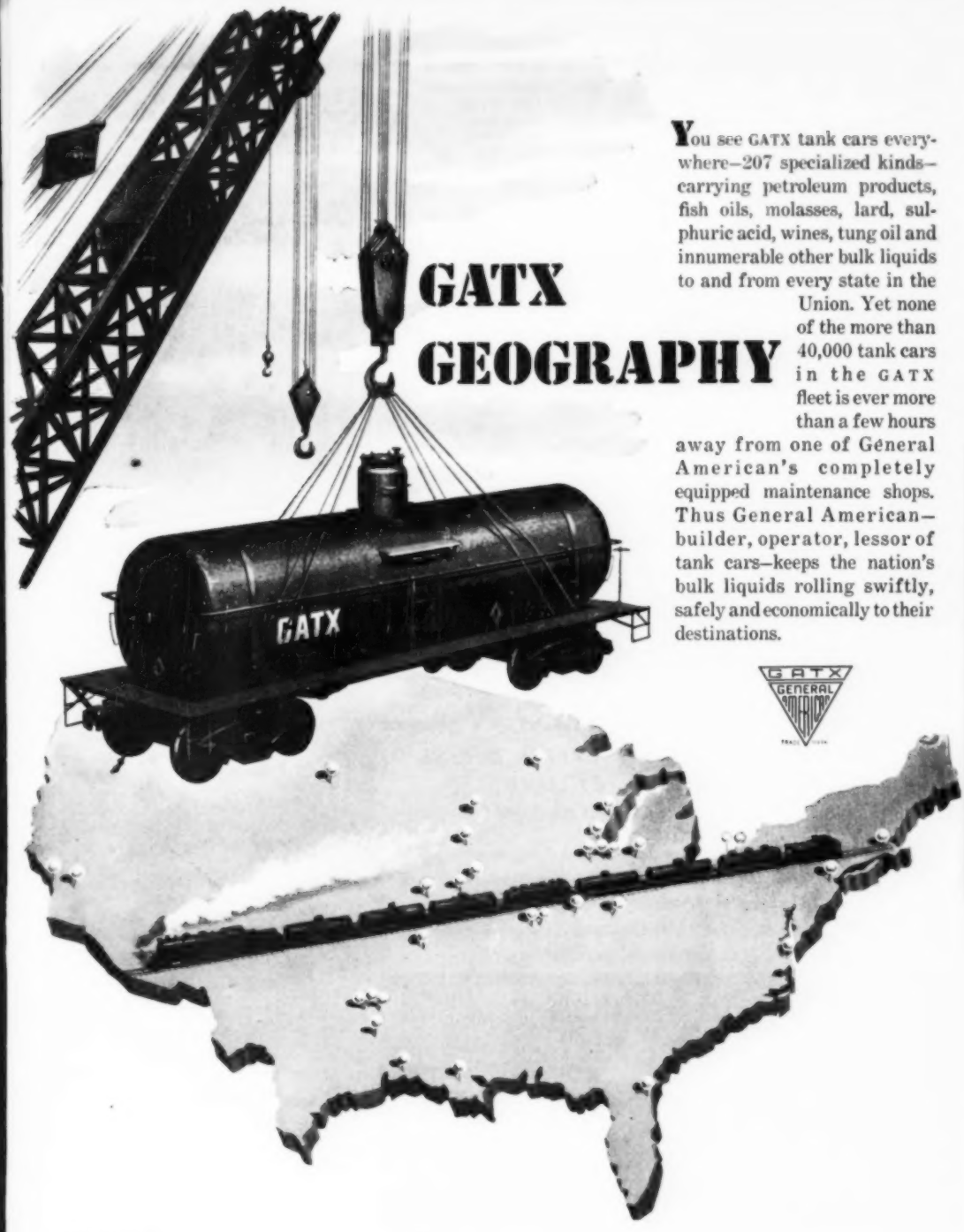

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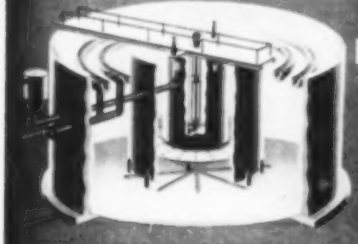


WRITE FOR BULLETIN 656

FOR
• WATER SOFTENING
• TURBIDITY AND COLOR REMOVAL
• INDUSTRIAL WASTE TREATMENT

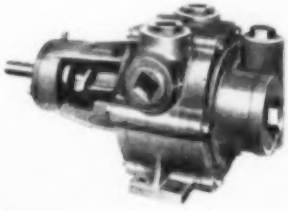
WALKER PROCESS EQUIPMENT INC.
EQUIPMENT • EQUIPMENT ENGINEERING
AURORA • ILLINOIS

dusts as small as 1 micron. This filter is claimed to have exceptionally low resistance, making breathing as effortless as through an ordinary handkerchief. It is claimed that this combination of properties produces a mask which workers will wear, even when the supervisor's back is turned. *The Goggle Parts Co., 1468 West 9th St., Cleveland 13, Ohio.*

UNBREAKABLE, SAFE:

Acid Pouring Container

Automotive Rubber Co. is offering a metal-reinforced rubber acid container in a 5-gal. size, designed for safe handling and pouring, and equipped with a 14-in. long spout, similar to a garden sprinkling can. The new container is constructed of perforated steel with all seams welded. It is then completely covered, inside and out, including handles, with $\frac{1}{8}$ in. of tough, seamless, semi-hard rubber. The inner and outer coatings are made continuous through the perforations in the metal to assure permanent adhesion. *Automotive Rubber Co., 8601 Epworth Blvd., Detroit 4, Mich.*



HEAVY-DUTY SERVICE:

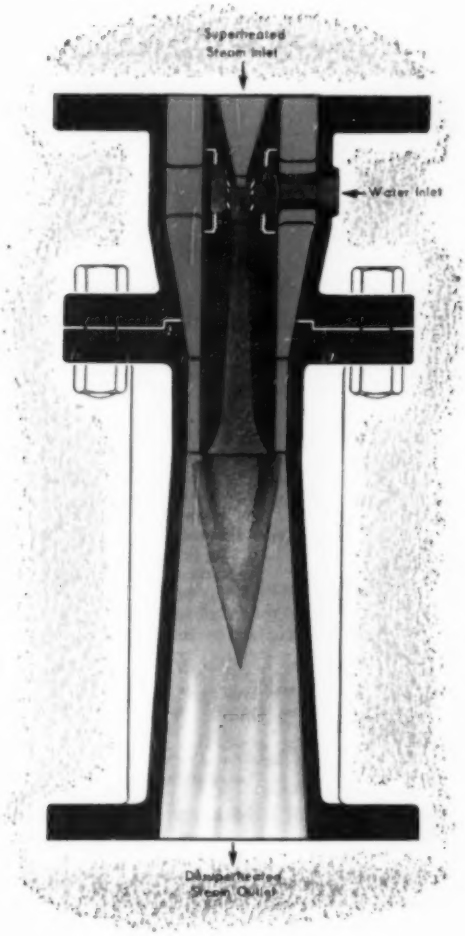
Rotary Pump

Yale & Towne Mfg. Co. is offering a newly developed heavy-duty design of its Tri-Rotor pump, designed particularly for handling non-lubricating liquids. The pump is going into applications involving handling of solvents and low-viscosity liquid fuels at pressures of 50 psi. and under. The pump is of cast iron, in sizes of 2, 2½

(Continued)

an SK "reason why"

provides high efficiency **year after year**



An ancient discovery, the wheel . . .
Symbolizes the efficiency of simple design.

An SK Venturi Type Desuperheater . . .
Employs the simplicity of the jet . . .
To desuperheat steam efficiently . . .
Year after year.

This type is particularly applicable . . .
Where steam flow varies widely . . .
With consequent changes in water flow.

In operation, the Venturi Type . . .
Increases steam velocity in the venturi . . .
And introduces water in small streams . . .
At the point of greatest turbulence . . .
To discharge the fog-like mixture . . .
Into the main steam flow.

An SK Venturi Type Desuperheater . . .
Offers a 1 to 10 capacity range . . .
Requires water pressure equal only to steam . . .
Takes no more space than the pipe . . .
And has a low pressure drop.

SK Venturi, Absorption and Spray Types . . .
Are fully described in Bulletin 6-D . . .
Which is available upon request.

SCHUTTE and KOERTING Company
Manufacturing Engineers

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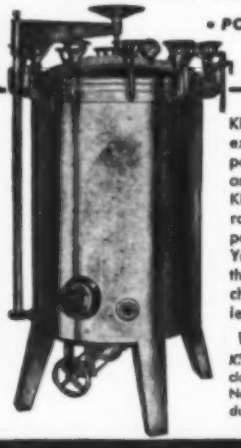
JET APPARATUS • HEAT TRANSFER EQUIPMENT • STRAINERS • CONDENSERS AND VACUUM PUMPS • OIL BURNING EQUIPMENT • ROTAMETERS AND FLOW INDICATORS • RADIAFIN TUBES • VALVES • SPRAY NOZZLES AND ATOMIZERS • GEAR PUMPS • DESUPERHEATERS

THE HEART OF A GOOD FILTER
IS ITS FILTER LEAVES

You can depend on KLEIN

• POSITIVE FILTRATION • NO CLOGGING
• FULL DRAINAGE

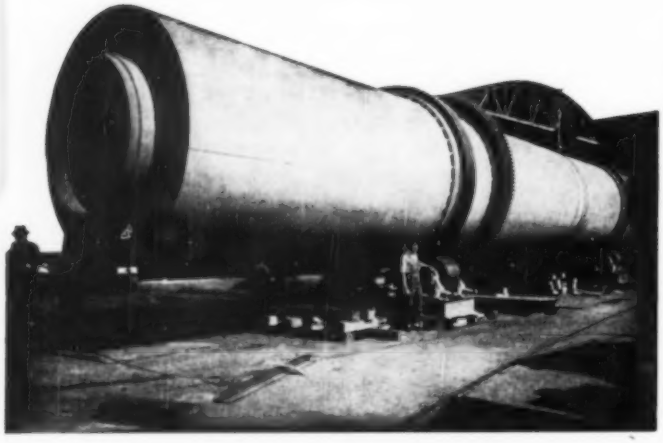


Klein Ideal Diatomaceous Earth Filters and the exclusive Klein Filter Leaves, in combination, assure positive filtration at all times. Operation, cleaning and maintenance costs are at a minimum with Klein Filters. In addition, many radical innovations are incorporated in Klein Ideal Filters. You'll want to know about all of these if you have an industrial, chemical or food filtration problem in your plant.

Write for latest Klein Bulletin

Klein Filter Leaf—if damaged, metal cloth easily replaced. No rivets. Note horizontal headers—central duct—Klein Cleanout Cap.

KLEIN FILTER & MANUFACTURING COMPANY
ESTABLISHED 1909
1223-29 School Street • Chicago 13, Illinois



DRYERS—DRYERS—DRYERS

STANDARD Rotary dryers are used throughout the world. STANDARD dryers are competently engineered and sturdily built in a wide variety of types and sizes for drying diverse products, such as chemicals, fish meal, garbage, tankage, humus, fertilizer, sewage, sludge and mineral and agricultural products. Stock designs available, sizes 2 feet to 10 feet diameters.

Let our engineers help you with your problems—regardless of your location.

We welcome your inquiries.

STANDARD STEEL CORPORATION
Engineers—Manufacturers
5003 Boyle Avenue Los Angeles, Cal.

and 3 in., for capacities from 80 to 100 gpm. The pump may be equipped with solid, bypass or variable-volume-control type heads, enabling it to meet a wide variety of requirements, since all heads are interchangeable. Combination radial and thrust roller bearings are employed, with internal parts fitted in iron or bronze as required, together with a special alloy shuttle, complete with carbon bushing. *The Yale & Towne Mfg. Co., Stamford Div., Stamford, Conn.*

LIGHT IN WEIGHT:

Hand Pallet Truck

Lyon-Raymond Corp. has redesigned its standard lightweight hydraulic pallet truck to accommodate expendable four-way corrugated paper pallets of the type having large cylindrical supporting columns. These 8-in. diameter columns in the center and at the outer edges make it necessary to provide a truck which has a narrow over-all width and at the same time a wide spacing between forks. The new truck uses forks only 6 in. wide, with a 10 in. opening between forks. It is equipped with rubber-tired front wheels, a floor friction brake which acts when the towing handle is down, and a hydraulic lift for 2,000 lb. capacity. *Lyon-Raymond Corp., 246 Madison St., Greene, N. Y.*

SELF-BALANCING:

Portable Propeller Mixer

The United States Motor Co. has introduced a new belt-driven portable industrial mixer featuring an arrangement of propeller shaft and motor which insures inherent balance of the assembly on the tank edge. The centers of gravity of both mixer and motor are below the support point, so that little pressure on the clamp is necessary. This arrangement is achieved by placing the motor outside the mixing tank, on one side of the clamp, with the mixer shaft, driven by a belt, inside the tank on the other side of the clamp. Thus the motor is away from

(Continued)

The Little Trap *with the Big Thirst*

Yarway Impulse Steam Traps—those little traps with the big thirst—are doing a giant's job for hundreds of plants in many industries throughout the country.

For instance, Yarways are ideally suited to refinery work because they literally *drink* the condensate—discharging continuously on heavy loads, intermittently on light loads. Hence they provide maximum heat in the shortest possible time.

Yarways are all-weather traps, equally efficient outdoors or in—require no protection against freeze-up.

Yarways are suitable for all pressures without change of valve or seat. Compact design makes them easy to install, and simplicity of construction (only one moving part) minimizes maintenance

Next time old-type traps need repair, consider replacing them with Yarway Impulse Traps. New Yarways frequently cost less than the repair job. *Already more than 600,000 have been bought!*

See your nearest Supply House, or write for Bulletin T-1739.

YARNALL-WARING COMPANY
137 Mermaid Ave., Philadelphia 18, Pa.

Ask about the Yarway 30-minute color and sound motion picture, with Lowell Thomas speaking—available for group showings.

YARWAY IMPULSE STEAM TRAP

FLOATLESS
MAINTENANCE-FREE
LEVEL CONTROL

UNLIMITED LIFE
No Moving Parts to Wear Out.

SAFETY
Low Voltage in the Probe Circuit.

MAINTENANCE-FREE
No Vacuum Tubes.

SIMPLICITY
No Floats, Seals, or Moving Elements.

OPERATION
Two probe rods reach into the tank to the levels where pump-on and pump-off operations are required. Actual contact of the probes with the liquid operates Photoswitch Control which makes and breaks the pump-control circuit.

PHOTOSWITCH Level Controls, effective for all conductive liquids, are available for single-level indication or control, on and off pump control, and boiler feedwater control.

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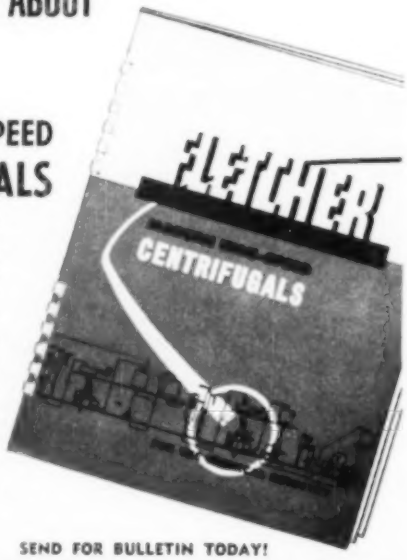
HIGH SPEED
CENTRIFUGALS

This booklet contains down-to-earth facts, substantiated with clearly understood photographs and drawings on Fletcher Centrifugals. Before you specify just any Centrifugal, send for this illuminating booklet . . . see why Fletcher Centrifugals are recommended and widely used in the chemical industry. It's free.—Write for it, on your business letterhead, please.



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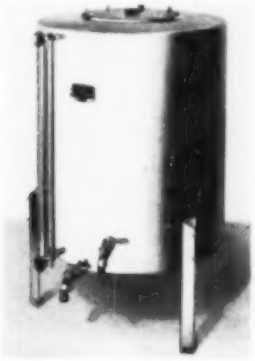
FLETCHER WORKS, 235 GLENWOOD AVE., PHILADELPHIA 40, PA.

heat, fumes and spray, and it is impossible for lubricant to drip from the motor into the tank. Interchangeable belts and pulleys are available for speed changes. Shaft length changes can also be made readily to take care of deeper or shallower tanks. Mixer parts are produced in stainless steel, aluminum, bronze, iron, Monel and other metals, sizes ranging up to 3 hp. *The United States Motor Co., 178 Centre St., New York 13, N. Y.*



AIR-TIGHT:

Stainless Storage Tanks

To supplement its line of stainless steel mixing tanks, the Alsop Engineering Corp. has developed a complete new line of air-tight storage and settling tanks of all-welded stainless steel construction. The tanks have rounded corners, are highly polished, and are provided with self-draining bottoms. Although the tanks are not intended to operate under pressure, the stainless steel cover is equipped with a heavy rubber gasket to insure air tightness. One or more faucets, and top or side-entering agitators, can be provided if necessary. The tanks are equipped with gage glasses when specified, and also with stationary or portable stands. Stock sizes range from 5 to 250 gal. capacity. *Alsop Engineering Corp., Milldale, Conn.*

COMPACT, LIGHT WEIGHT:

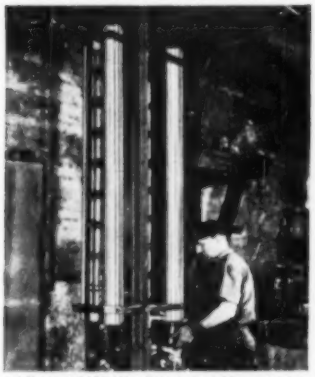
Vertical Speed Reducer

The American Pulley Co. recently has introduced a new vertical speed reducer for agitator drive which requires little headroom and weighs only ¼ to ⅓ as much as comparable speed reducers. The unit is built to mount right on the shaft of the driven machine, as readily as a pulley. It requires no costly supports or special founda-

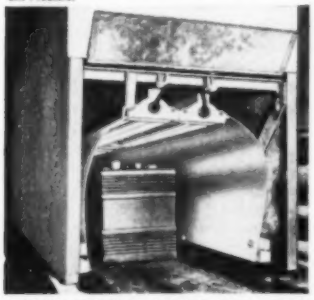
(*Continued*)

APPLICATION REPORTS
from the
CHROMALOX FILES

DEHYDRATING. Vari-colored powders for injection molding machines are completely and uniformly dried in 10 to 15 minutes with Chromalox Radiant Heaters.



METAL HEATING. Spherical molds containing compressed kapok are heated to 300° F. in one pass through a vertical oven formed with Chromalox Radiant Heaters.



ASPHALT-MELTING. Asphalt sealing compound is melted to provide proper "knit" between it and battery case. Bank of Radiant Heaters with variable control is installed in conveyor top. Side reflector sheets add efficiency.

Chromalox

Electric RADIANT HEATERS

For INFRARED

- Drying
- Evaporation
- Mass Heating
- Preheating
- Skin Drying
- Baking

and many other Applications

Quick, Low Cost Installation dependable service

FLEXIBLE! Easy to install in tunnels, single banks, double banks, ovens, etc. Gives infrared radiation in longer wave lengths which are absorbed almost equally well by all colors and textures of surfaces.

UNBREAKABLE! Rugged all-metal construction with aluminum body and shockproof, Inconel-sheathed CHROMALOX tubular heating element. Withstands shock, vibration, moisture and dust.

EFFICIENT! CHROMALOX tubular elements operate at 1400° F. Uniform, even heat—without "hot spots"—in low or high ambient temperatures. Units operate efficiently in all positions and at all angles.

COMPACT! Only 2 inches deep in nominal lengths of 2, 2½, 4, 5, 6 and 7 feet. Sections may be quickly interlocked to form their own oven, which can be further insulated for low, minimum heat losses.

CHROMALOX
Electric heat for modern industry

EDWIN L. WIEGAND COMPANY
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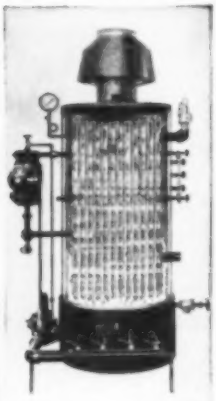
IC-45

OVER 4 DECADES' EXPERIENCE ARE BACK OF . . .



The KANE Boiler is built to A.S.M.E. specifications, in sizes to 30 H.P.

the Kane Boiler Package

Each KANE BOILER PACKAGE is carefully considered by us as an "individual" job—from the customer's requirements to the finished unit. And each BOILER PACKAGE is a compact, self-contained steam source that includes: the correctly sized KANE Automatic Gas-Fired Boiler complete with gas burner and controls to maintain required steam pressure; and an M-K-O Automatic Boiler Feed system designed to return condensate and supply make-up water as required for highest operating efficiency.

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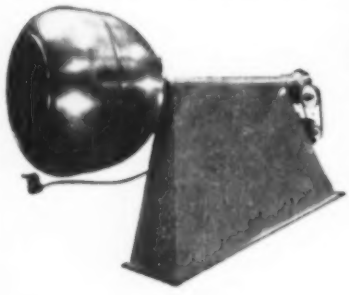

"LATINI" 38" REVOLVING PAN

with sanitary stand, ball bearings and ¾ H.P. motor

•

Unique Steam Heat arrangement . . . without coils on pan.

CHOCOLATE SPRAYING CO.
Chicago, Illinois

Represented by
JOHN SHEFFMAN,
152 West 42nd St.,
New York 18, N. Y.

tion. It is then driven by multiple V-belts from a vertical motor. Since pulley changes can readily be made, speed changes are easily effected. Produced of stock parts, it will provide any driven speed below 154 rpm., at a cost well below that of other vertical drives, and only slightly higher than that of horizontal speed reduction drives. *The American Pulley Co., 42 Wissahickon Ave., Philadelphia 29, Pa.*

RESISTS CORROSION:

Resin Lining

Introduced under the name of Carbo-Flex, a thermo-setting resin lining material for tanks, and for covering concrete floors, has been introduced by the Carboline Co. The resin is said to resist acids, alkalies and solvents at temperatures as high as 325 deg. F., being impervious to most corrosives and solvents except nitric acid and sulphuric acid over 45 per cent concentration. The material is trowelled on to a thickness of 1/32 to 1/8 in., which is sufficient for most jobs. It can be applied to horizontal or vertical surfaces and sets in 2 to 20 hours, depending on temperature. Hard and relatively brittle, it still is sufficiently flexible to prevent cracking in most general service. For other applications it can be reinforced with Fiberglas. Installation is simple, without special tools. *The Carboline Co., 7603 Forsythe Blvd., St. Louis 5, Mo.*

Briefs . . .

PLASTIC CARBOY. A newly developed plastic claimed to be inert to mineral acids will be used in a new all-plastic acid shipping carboy, according to a recent announcement. Available sizes will be 13, 6½ and 5 gal. The carboy will require no protective wooden box and will be designed to stack like bricks, with successive layers keyed by mating projections and indentations. Saving of one-third in weight and space is claimed compared with present glass carboys and boxes. *Charles K. Feinberg, P. O. Box 1036, Newark 1, N. J.*

SAFE INTERCOM. To permit the use of inter-communication systems in Class I Group D hazardous areas, Executone, Inc., has developed an electronic intercom system which has been approved by Underwriters' Laboratories. The system permits selectivity, any station on the system being able to call any other station in either hazardous or non-hazardous areas. Another feature is the

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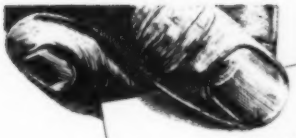
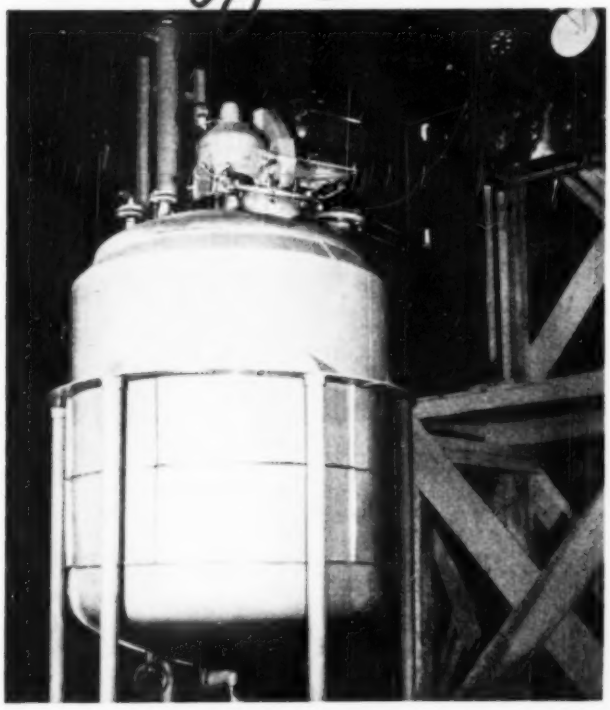


Resistance to Adherence

—another Cost-cutting Characteristic of Stainless Steel



STAINLESS Steel has built its reputation in the chemical processing industry on its established ability to resist corrosion, resist heat and resist hard usage. But there's another factor of resistance, not so widely recognized but highly important from the standpoint of production economies—resistance to adherence.

Stated simply, this means that certain materials, which during processing have a tendency to cling to common steel (or to the coating with which such steel is protected), *will not stick to Stainless Steel.* Numbered among these materials are food products, gums from rayon and other textile fibers, dyes, wood gums, resins.

As a result of its ability to resist adherence, Stainless Steel equipment makes possible these important savings in time and costs:

Machinery can be kept in operation for much longer periods without cleaning.

Errors in control of process temperatures will result in less damage to equipment.

Spoiled materials can be cleaned or scoured away with less time and labor, and with less damage to equipment.

These advantages, plus the many other cost-saving characteristics of Stainless, you can obtain at their best in U·S·S Stainless Steel—a perfected, service-tested Stainless, uniform in composition, finish and quality.

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NEW EQUIPMENT, cont. . .

so-called "Remote Reply" which permits the person called to answer from a reasonable distance without approaching the station. *Executone, Inc., 415 Lexington Ave., New York 17, N. Y.*

DETACHABLE V-BELT. To enable users to service emergency breakdowns, without carrying a large endless V-belt inventory, Worthington Pump & Machinery Corp., has developed the Vee Ply belt, a quick detachable type. It is constructed of identical units of duck impregnated with rubber and cut to form links which are joined together with special steel rivets. The over-lapping plys can be separated and slipped off the rivets at any point without special tools, enabling the stock roll to be used to produce belts of any length. When an endless belt is reinstalled on the drive, the Vee Ply belting can be returned to stock. *Worthington Pump & Machinery Corp., Harrison, N. J.*

CORRUGATED CONVEYOR. Russell Manufacturing Co.'s new conveyor belt, introduced under the name of Ruff-Ridge, consists of a solid woven carcass impregnated with neoprene and coated with neoprene and natural rubber, the top surface being molded into corrugations about 3/32 in. deep on 5/16 in. centers. The resulting chemical- and moisture-resisting belt will convey light goods in cartons or heavier materials in bags up inclines of 30 to 40 deg. without slipping. Widths up to 24 in. are available. *Russell Manufacturing Co., Middletown, Conn.*

PIPE WRAP. Fiberglas is being applied to produce Coromat, a new wrap for underground pipe lines which is produced as a porous mat of glass fibers reinforced with long continuous strands of glass yarn. The wrap is designed to resist soil acids and electrolytic action. Incorporation of the high-strength yarns in a multi-directional pattern increases the tear strength of the basic Fiberglas pipe wrap, it is claimed, by 200 to 400 percent. Through elimination of breakage, 1,000 to 1,200-ft. rolls can be used, doing away with frequent machine stoppages to add new rolls. *Owens-Corning Fiberglas Corp., Toledo 1, Ohio.*

ELECTRIC OILER. Automatic operation in oiling is accomplished with the new Electro-Oiler offered by Oil-Rite. Oil is released from a reservoir by a solenoid-operated

(*Continued*)

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for

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The horsepower is a function of mixer design and is justified by the economics of production.

Therefore, you Save Money in
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Operating Cost
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By proper design of your mixing equipment for
Maximum operating efficiency
Maximum rate of production
Maximum yield of product

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Turbo-Mixer Corporation Unit

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valve through single or multiple sight feed valves to a number of individual bearings to be lubricated. The solenoid is connected across the line of the driving motor, so that when the machine starts, lubrication of the bearing starts immediately. Conveyors, for example, can thus be lubricated automatically whenever they are in operation. *Oil-Rite Corp., 3466 South 13th Street, Milwaukee, Wis.*

GAS DETECTOR. Known as the Lor-Ann combustible gas detector, a new device said to be the first such detector to be approved by Underwriters' Laboratories, is now available to monitor combustible gases in plant atmospheres. It uses a number of remote gas analysis cells piped up to a central air-tight, dust-proof control cabinet. The remote heads instantly "telegraph" presence of a dangerous condition to the control panel which operates audible and visible alarms, and takes over operation of plant machinery, fire-fighting equipment, ventilation equipment or whatever may be necessary under the existing circumstances. *Lor-Ann Instrument Co., 58 Montgomery St., Jersey City, N. J.*

PIPE JACKETING. An improved method for applying aluminum protective jackets over insulated pipe lines has been developed jointly by Minnesota Mining & Mfg. Co., and Childers Mfg. Co. The method employs jacketing made by the latter concern which is then secured to the line by taping on with bands of the former concern's No. 471 plastic film Scotch Tape. This tape is said to stand weathering indefinitely, and to be uninjured by cold, or by heat up to 170 deg. F. The new method is claimed to cut installation costs as much as 75 percent. The combination of tape and flexible aluminum jacketing material can be applied over insulated lines for less than 6 cents per sq.ft. labor cost, in contrast to 15 to 35 cents per sq.ft. for labor in ordinary metal jacketing.

EXPERIMENTAL DE-IONIZER. Chemical Process Co. is offering a small experimental de-ionizer in transparent plastic material for small-scale experimental work in de-ionization, particularly in evaluating various ion exchange resins. The standard type consists of two cells, but a single-cell type is also available for a similar range of uses. *Chemical Process Co., 901 Spring St., Redwood City, Calif.* —END

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AND
PACIFIC INDUSTRIAL CONFERENCES
Conferences will include a large group of technically-related societies. Exposition features will be: 100 exhibitors (showing thousands of items) — educational exhibits — a continuous showing of industrial movies. If it is really new, you can expect to see it here! For exhibit space, write: c/o Hotel Whitcomb, San Francisco 1, California.
Nov. 1st to 5th incl. 1949
Hours: 12 noon—10 p.m. daily; 10 a.m.—6 p.m. Saturday
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Rubber makes a "pipe" dream come true

For years industrial men have been seeking ways to make heavy pipe absorb vibration and wear longer.

Now Hewitt engineers have the answer to this production "pipe" dream . . . a way to reduce replacement costs!

The answer is Hewitt steel-wire-reinforced Flexible Rubber Pipe. This pipe has proved so resistant to harsh abrasive materials that it has doubled and tripled the service life in many installations. What's more, it often costs no more to begin with!

This versatile pipe is being used to carry gritty, abrasive materials in ash disposal systems at power plants . . . high phosphate-content material as well as strong acid and alkali solutions at chemical plants . . . slurries in coal and metal mines . . . and for many other solids-in-solution handling jobs.

H-R Flexible Rubber Pipe is easy to handle and couple. You can curve it and flex it, thus often eliminating costly elbows.

It can be made to resist abrasive actions, to withstand oils, and to stand up against the acids and chemicals that normally attack other materials. And, of course, it won't rust.

For full information on how Hewitt Flexible Rubber Pipe can be applied to your own needs, phone the Hewitt Distributor listed in the classified section of your phone book. Or write direct to Hewitt Rubber Division, 240 Kensington Ave., Buffalo 5, N.Y.

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Design and construction of complete bulk materials handling systems.

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no more efficient solubilizer for 2,4-D

DIMETHYLAMINE

amine	pounds of 2,4-D acid neutralized by one pound of amine	molecular weight
DIMETHYLAMINE	4.9	45
Diethylamine	3.0	73
Triethylamine	2.2	101
Diethanolamine	2.1	105
Diisopropanolamine	1.7	133
Triethanolamine	1.5	149
Triisopropanolamine	1.2	191

Compare it with the other amines. Pound for pound, dimethylamine goes further than any of the others listed. Its efficiency as a solubilizer for making 2,4-D salt concentrates is from 1-3/5 to 4 times greater. Dimethylamine's excellent solubilizing characteristics, low molecular weight, and high efficiency make it an outstanding amine for the manufacture of 2,4-D concentrates. Pound for pound, there's no better buy! It will pay you to investigate dimethylamine further. Write, wire, or phone Commercial Solvents today!

PROPERTIES

At ordinary temperatures and pressures Dimethylamine is a gas, possessing a strong ammoniacal odor. It is sold as an aqueous solution.

Boiling Point: 6.88°C at 760 mm of mercury
Solubility: Soluble in water, alcohol, ether, and many organic liquids
Flash Point, TCC (35% solution): 21°F
Weight per U. S. Gallon (25% solution): Approximately 7.8 pounds at 68°F

OTHER USES

Also Used in the Manufacture of
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New Products and Materials

JOSEPH A. O'CONNOR, *Assistant Editor*

BY THE TON:

Phytosterols

Purified vegetable sterols, now to be had at low cost in tonnage quantities from Distillation Products, Inc., promise to spark further research in the emulsion field. In the past, the high cost of animal sterols discouraged research into commercial processes which would utilize the reported ability of sterols (1) to stabilize oil-in-water and water-in-oil emulsions, and (2) to serve as raw material for the synthesis of surface-active agents, pharmaceuticals and other chemical products.

Refined from soybean oil, these inexpensive vegetable sterols are fine white crystals with a minimum purity of 95 percent. They are soluble in acetone (2g. per 100cc.), ethanol (2g. per 100cc.) and ethyl ether (10g. per 100cc.). They melt at 135-138 deg. C. and have a bromine number of approximately 500g. per kilo. *Distillation Products, Inc., 755 Ridge Road West, Rochester 13, N. Y.*

REACTIVE:

Beta-Chloropropionitrile

With an active halogen and a nitrile group, β-chloropropionitrile, American Cyanamid Co.'s new organic, possesses the reactivity that makes it a likely building block in organic syntheses.

Slightly soluble in water, β-chloropropionitrile is very soluble in most organic solvents. It has a boiling point of 174-176 deg. C. at 752 mm. Hg.

Trial-lot quantities of this new organic are now being offered. *American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y.*

STICK FORM:

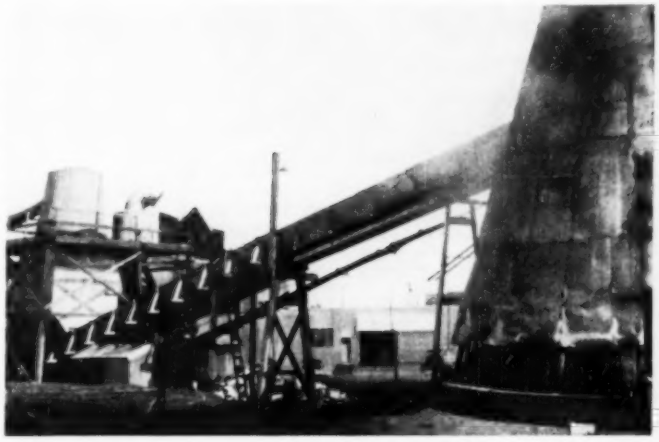
Corrosion Preventive

Tretolite Co. now has a stick form of its Kontol Corrosion Preventive. This new product, designated Kontol 118 Stick, is in the form of a cylinder 1¼ in. in diameter by 18 in. long. The stick inhibitor is soluble in hydrocarbon solvents, and has a melting point of 175 deg. F.

The stick form was developed in response to a demand for a conveniently usable inhibitor for gas and gas-condensate wells in which the tubing is packed or mudded-off, and where the addition of liquid inhibitors down the casing annulus would be of no purpose. Kontol 118 Sticks exhibit the same corrosion-preventive properties as the liquid Kontol 118, which is widely used in the petroleum industry for the protection of oil and gas well equipment, flow lines and gas lines. The stick inhibitor is applied by dropping into the tubing through a lubricator at the well head.

On reaching the bottom of the tubing, Kontol 118 Stick slowly melts and disperses in the well fluids. During production of the well, a strongly adsorbed protective film forms on the tubing, well head and flowline surfaces. Due to the lingering effect of the inhibitor, treatment of the well may be made at intervals of from two or three days to a week without a significant decrease in protection.

Kontol 118 Stick is available in individual disposable tubes, packaged 40 to the carton. *Tretolite Co., St. Louis 19, Mo.*



Pilot Plant Payoff for Log Pond Idea Leads To Profitable Product From Waste Cedar Wood

Busily turning waste cedar wood into a new organic compound for treating boiler water is the pilot plant (above) operated by the Chemical Division of the Portland Shingle Co. at Portland, Ore. It took 15 yr. of research and testing to achieve this pilot-plant production. But today Portland Shingle, planning a bigger plant, is cashing in on this novel use for cedar waste.

It all began when Guy J. Bailey, of Battle Ground, Wash., observed that metal long immersed in a log pond of stagnant water, filled with bark and discarded outrun of cedar logs, when removed was free of scale and rust. Bailey looked into the still water, did some deep thinking, came up with an idea. He followed through on his idea, carrying out the initial development and field testing of the treating compound, now called Borgana. Today Bailey, with more than 40 yr. of experience in the steam boiler industry, is technical adviser of Portland Shingle's Chemical Division.

Extended experiments by the company's research department convinced its engineers that Bailey's process would pay off. It involves the breaking down of waste from cedar logs by hogging. Then this material is distilled several times. The resulting distillate is a non-poisonous vegetable compound which, it was found, prevents rust and corrosion in boilers, pipes and valves.

How does Borgana work? It acts directly on acids, organic particles, car-

(*Continued*)

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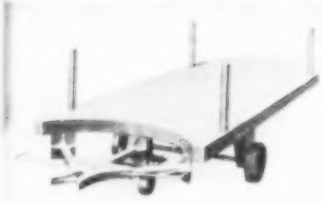

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bohydrates and such scale-forming compounds as the bicarbonates of calcium and magnesium. It dissolves scale. It helps to neutralize any oil present with the water itself, thereby tending to eliminate oil's effect on the boiler and the burning of tubes. Borgana neutralizes the carbonates and organic growth which cause foaming. With its organic base, it prevents the chemical action that causes corrosion. Borgana coats minute particles of silica and prevents them from solidifying, thus eliminating the formation of scale.

When, as a result of defective condensers, sea water gets into marine boilers an acidic condition develops. This leads to formation of damaging magnesium chloride. Borgana neutralizes the acidity and also puts magnesium carbonate and sodium chloride, both scale-formers, out of action.

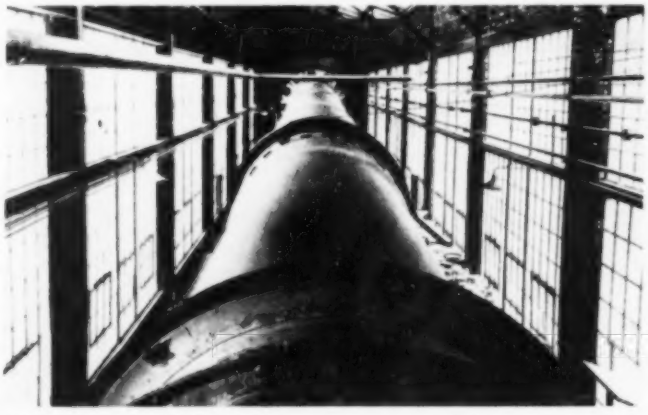
During tests carried on in the past two years Borgana has been successfully used in food processing plants, lumber mills, ships and many types of plants where live steam is used for processing.

Borgana has proved successful in cleaning boiler and steam systems, and also in providing a protective treatment that prevents scale, corrosion and other accumulations. The chemical has been used successfully in stationary, portable and marine boilers. Scale and corrosion from salt contamination have also been effectively treated.

Borgana comes in liquid form. It is chemically neutral and contains no active alkalis or acids. It is put directly into boiler drums or taken in through feed pumps or injectors, which will not clog. Two blowdowns a day and an occasional washing soon insure a clean boiler. The need for turbining the boiler is eliminated.

The pilot plant at Portland is now producing 50 bbl. a day, and the product is being packaged in 55-gal. drums. But plans for construction of a plant with a capacity of 100 bbl. a day are under way. Since processing costs are low and the abundant cedar waste is far less expensive than raw materials for other treating compounds, Borgana retails at $65 a 55-gal. barrel.

Best of all, as Portland Shingle's President Alfred H. Schmidt cannily remarks, "There is enough raw material now being burned to produce enough treating compound to supply a major portion of the steam boilers throughout the country." Further utilization of the red cedar logs has been a project of the research department of Portland Shingle for the past year. The wraps will soon be taken off some other products. *Portland Shingle Co., 9036 North Denver Ave., Portland 3, Ore.*



Giant Rotary Kiln Calcines Improved TiO$_2$

Improved types of titanium dioxide now being turned out by the Calco Chemical Division of American Cyanamid Co. come as the climax of extensive development work that resulted in the introduction of new processing equipment.

Unitane 0-310, an anatase type, is particularly suited for high-temperature baking enamels, refrigerator finishes, lacquers and phenolic resin enamels. It is recommended also for use in architectural finishes and industrial finishes where the high hiding power of rutile is not required and where the clear bluish tone of anatase is preferred for its decorative effect. It is characterized by low reactivity with most vehicles and pro-

(*Continued*)

PENTEK®

PENTAERYTHRITOL (TECHNICAL GRADE)

FOR SURFACE COATINGS OF BETTER HARDNESS, SUPERIOR GLOSS AND COLOR RETENTION, MORE RESISTANCE TO WATER AND ALKALI

PROPERTIES

Formula	$C(CH_2OH)_4$
Composition	approximately 90% pentaerythritol, and 10% dipentaerythritol
Appearance	white powder
Melting Range	185°-256°C.
Hydroxyl Content	47.5%
Combining Weight	35.8
Water	0.3%
Ash	0.06%
Specific Gravity 25°/4°C.	1.38
Bulk Density	0.7 (44 lbs./cu.ft.)

Solubility (g. per 100 g. solvent)	
Water at 25°C.	8
Water at 100°C.	90
Ethanol at 25°C.	6.5
Benzene at 25°C.	insoluble
Acetone at 25°C.	insoluble
Oils at 25°C.	insoluble
Glycerol at 100°C.	approx. 10
Pyridine at 100°C.	approx. 5

General

Non-hygroscopic; non-toxic; all hydroxyl groups esterifiable

PENTEK is available in 80-lb. multiwall bags. Fully detailed illustrated booklet on Pentek will be mailed promptly upon request on company letterhead.

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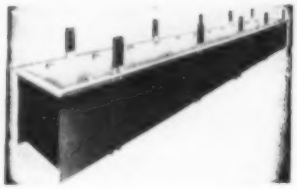
RUBBER INSULATED EQUIPMENT FOR HANDLING CORROSIVES



★ PROCESSING TANKS

Any size, any shape, open or closed, fabricated and or rubber lined for all chemical processing.

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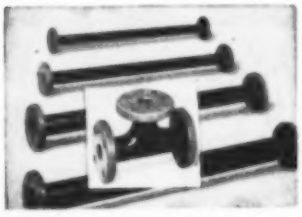
Ducts, vents, hoods, housings, fabricated and or rubber lined. All joints companion flanged.



★ PIPE and FITTINGS

Flanged type, lined with natural or synthetic rubber. Steel, cast or wrought iron. 1½" I.D. and up.

AUTOMOTIVE RUBBER CO. INC.
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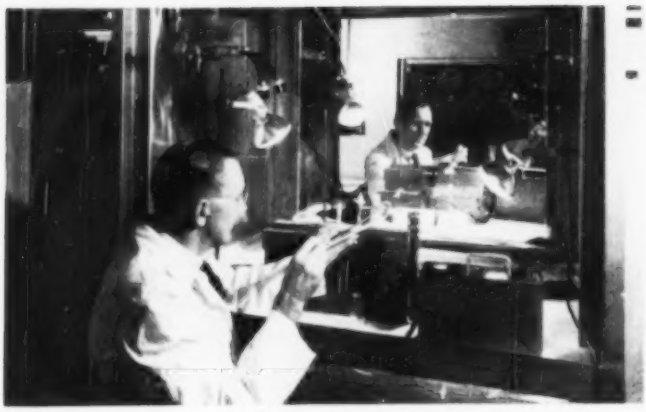


IT'S NOT ALL DONE BY MIRRORS, BUT THEY HELP

Aided by a mirror and working behind a lead shield, this researcher at the Bell Laboratories, Murray Hill, N. J., dilutes radioactive strontium chloride solution. Bell gets its radio-isotopes from AEC's Oak Ridge plant, uses them to study electron emission in vacuum tubes and the penetration of preservatives used to treat telephone poles.

duces finishes of excellent gloss and gloss retention.

In lithographic inks, it has good resistance to fountain solutions and is useful in printing inks where the anatase type of titanium dioxide may be preferred.

Unitane OR-342 is a new type of rutile titanium dioxide developed especially for use in enamel finishes and related products. It is particularly adapted to formulas including more reactive vehicles, such as the maleic-modified types and certain highly bodied oleoresinous varnishes.

This new rutile titanium dioxide performs especially well in metal decorative roller coatings where very thin films are laid down and must have the maximum flow to give satisfactory coverage and uniformity. It is excellent for use in alkyd baking enamels because it maintains high gloss and good color retention under aging.

Other new and improved types of Unitane will be announced in the near future. Meantime, these two are being produced and are standardized for distribution. *American Cyanamid Co., Calco Chemical Division, Bound Brook, N. J.*

INTERMEDIATES:

A Brace of Organics

Two new organic compounds have just been developed by the B. F. Goodrich Chemical Co. They are β-chloropropionic acid and β-mercaptopropionic acid.

In addition to the reactions possible with the active chlorine, β-chloropropionic acid undergoes the usual reactions of carboxylic acids, such as esterification, amide formation and salt formation. It is available as a white, crystalline, water-soluble solid, melting at 36-39 deg. C.

To be had for the first time is β-mercaptopropionic acid. It reacts both as a carboxylic acid and as a mercaptan. With a purity of 99 percent, it is obtainable as a water-soluble liquid that distills at 114-115.5 deg. C. at 13 mm.

Not only do these two chemicals possess unique properties themselves, but they may also be used as intermediates for the synthesis of new and unusual organic compounds. They are presently available in experimental quantities. *B. F. Goodrich Chemical Co., Rose Building, Cleveland 15, Ohio.*

MODIFIER:

Surface-Active Agent

Formulation of a new surface-active agent, tetra-naphthenoyl triethylene tetramine, is announced by the Dearborn Chemical Co. The agent has wide commercial possibilities as a modifier, plasticizer or additive.

An acylation product of triethylene tetramine with naphthenic acid, it is a very high viscosity oil, dark in color, insoluble in water, but soluble in a variety of organic solvents. It has an acid number of about 30.

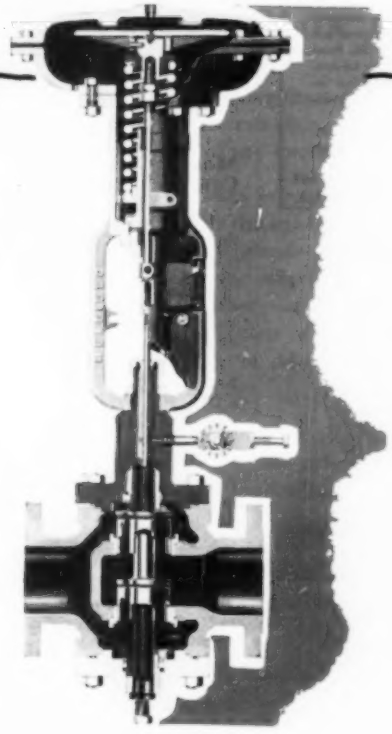
This new modifier has suggested

(*Continued*)

when the chips are down...

YOUR BEST BET is the SERIES "700"

DIAPHRAGM CONTROL VALVE



PRECISION processing demands high quality, low maintenance and continuous operation from all production tools. The Belfield "700" is the diaphragm control valve you can count on . . . every time and all the time!

Here are the reasons why:

ADVANCED DESIGN that gives you a host of special operational features in addition to the ones you expect to find in a fine valve.

PROVED QUALITY that stems from more than 100 years of experience with the right design, the right material, the right specification for each and every job.

NATIONWIDE SERVICE from the Minneapolis-Honeywell network of branch offices and factory-trained field engineers, as near to you as your phone.

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Modern and efficient equipment made by Davenport Machine & Foundry transforms semi-solid plant waste into profitable by-products.

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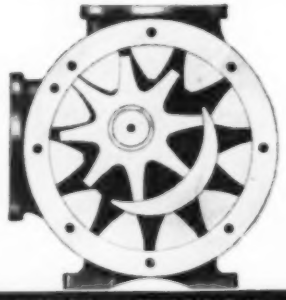
We design, fabricate, and supervise the installation of complete drying plants. Your absolute satisfaction is guaranteed by the undivided responsibility of a single source of supply. Write for our catalog A.

DAVENPORT Machine and Foundry Co. Davenport Iowa U.S.A.

You can **PUMP IT** *with*



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The Pump that moves any clean liquid regardless of viscosity . . . that is the Viking Rotary Pump.

Its "Gear within a Gear—2 moving parts" principle gives you this service. Its rugged construction, without small intricate parts, springs, gadgets, etc. assure long, dependable life.

Viking rotary pumps are engineered for the job . . . to do the work assigned them. Ask for free folder 49SC today. Recommendations gladly given without obligation.

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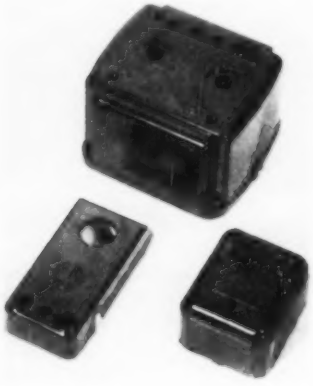
Viking PUMP COMPANY Cedar Falls, Iowa

uses as a conditioning agent in the manufacture of textiles, as an additive in pulp and paper making, as a flotation agent in minerals separation, as an oil demulsification agent and insecticide additive. It is commercially available in technical grade. *Dearborn Chemical Co., 310 S. Michigan Ave., Chicago, Ill.*



Molding Costs Cut By Phenolics

To reduce the cost and to simplify the molding of medium-high impact plastics parts, Rogers Corp. has come up with a series of new thermosetting phenolics. These materials can be molded on high-speed multi-cavity molds.

Named Luron, the new materials have an unusually low bulk factor, a fast rate of cure, and emerge from the mold with a high gloss finish. Clean and dustless, the new phenolics are of uniform particle size and are easily poured or automatically preformed. They can be compression-, transfer- or plunger-molded. Recommended molding pressure range is 4,000-6,000 psi.

Two grades of Luron are already in commercial use—RX-416 and RX-418. Both are made in black only. RX-418 differs from its companion material in that a stronger cellulose fiber is used to provide greater impact strength.

Because they cut costs and simplify molding operations, these thermosetting phenolics are already being widely used for such large components as transformer housings, industrial tote boxes and a variety of electrical units, the latter including outlet boxes, industrial light sockets and coil forms.

In addition to RX-416 and RX-418, both of which Rogers can supply out

(Continued)

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Stronger, More Lustrous, More Resistant to Chemical Attack

BECAUSE OF ADDED ALCOA ALUMINA

These crystal-clear Neutraglas* ampules made by Kimble Glass are so outstanding that Kimble can claim for them "the highest resistance to chemical attack of any known 'workable' glass."

Kimble uses ALCOA Alumina in making Neutraglas for the same reason that manufacturers throughout industry use ALCOA Aluminas and Fluorides. They help make products the *best* of their kind. Spark plugs . . . abrasive wheels . . . refractories . . . rubber . . . tooth paste . . . lumber—are but a few of the hundreds of products which are measurably better because of ALCOA Chemicals.

We've done a lot of research on the advantages of ALCOA Aluminas and Fluorides in many different products and applications. It is probable that we have data already on hand to help solve a problem of yours. Write to: ALUMINUM COMPANY OF AMERICA, CHEMICALS DIVISION, 1778 Gulf Building, Pittsburgh 19, Pennsylvania.

*Trade name of Kimble Glass, Division of Owens-Illinois Glass Co.

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Pump it with a
DEMING Sump PUMP

The complete line of Deming Vertical Sump Pumps offers you unusual selectivity. Available in various sizes, capacities range from 10 g.p.m. to 3200 g.p.m. with heads up to 120 feet and speeds from 860 to 1750 RPM. for motor drive. There are many applications where these pumps (wet or dry pit type) are used to advantage.

Typical applications include: water drainage . . . pumping heavy viscous or high temperature liquids . . . pumping quenching oil . . . hot water and other liquids in heat-treating processes . . . handling hot drainage, such as boiler blow-off, heating returns, etc. . . . screened sewage, etc.

Important features of Deming Vertical Sump Pumps, performance tables, and other helpful data are available in BULLETIN 4606. Write for a copy.

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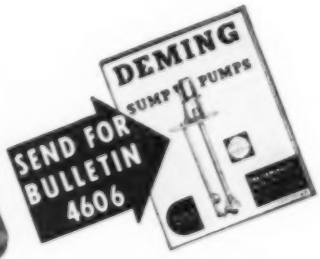

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THE COMPLETE LINE
PUMPS AND WATER SYSTEMS

of stock, several other grades are about ready for commercial application, and special formulations and colors can be furnished to meet individual requirements. *Rogers Corp., Mill & Duro Sts., Manchester, Conn.*

COMPLETE LINE:

Metallic Stearates

Arnold, Hoffman & Co., Inc., has recently added to the chemical specialties it manufactures a line of high-grade metallic stearates.

These stearates—aluminum, zinc, calcium, magnesium and barium—are now available for use in cosmetics, pharmaceuticals, plastics, lacquers, varnishes, paints, rubber, lubricants, surface coatings, waterproofing, cement and inks. *Arnold, Hoffman & Co., Inc., Canal & Waterman Sts., Providence 1, R. I.*

Briefs . . .

New emulsifier for the ortho-dichlorobenzene emulsion concentrates used to control the bacterial growth and putrefaction odors in garbage dumps in large cities is proving particularly effective. Made by Glyco Products Co., Inc., Emulsifier S-1072 is an amber-colored, viscous liquid that does not contain sulphonates. It is readily and clearly soluble in ortho-dichlorobenzene in the cold, and the concentrate emulsifies rapidly, with little agitation, in water over a wide range of concentrations. Emulsifier S-1072 can be had in commercial quantities and is quoted at 25c. per lb. in drums, fob. Natrium, W. Va. *Glyco Products Co., Inc., Brooklyn 2, N. Y.*

Lindane, the gamma isomer of benzene hexachloride of a purity of not less than 99 percent, has been approved by the U. S. Department of Agriculture as a residual fly spray for dairy barns. It will not contaminate milk. Thus given the green light, chemical companies are shipping wettable 25 percent lindane. *Dow Chemical Co., Midland, Mich.; California Spray-Chemical Corp., Richmond, Calif.; Pennsylvania Salt Manufacturing Co., Philadelphia, Pa.*

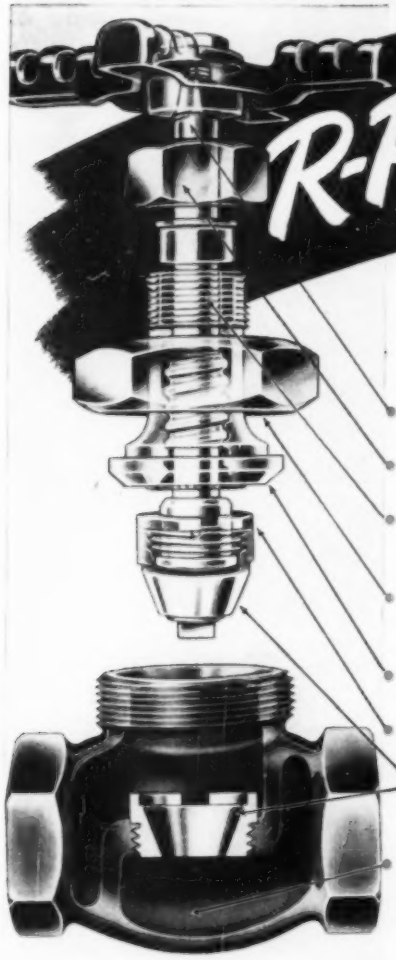
Menthol glucuronide, now available from the Sigma Chemical Co., is being used to prepare glucuronidase by the action of certain bacteria on a menthol glucuronide substrate. The former long and difficult method of extracting glucuronidase from tissue can be eliminated. *Sigma Chemical Co., 4648 Easton Ave., St. Louis 13, Mo.* —End

R-P & C HEAVY-DUTY BRONZE GLOBE VALVE

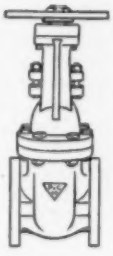
FOR

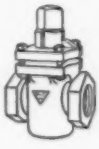
TOUGH THROTTLING CONDITIONS

500 BRINELL DISC AND SEAT



- **STEM** high tensile rolled bronze. Large diameter and long thread contact.
- **PACKING NUT** and gland follower of heavy bronze transmit even pressure onto packing.
- **STUFFING BOX** large and deep. Packed with formed rings of braided asbestos, lubricated and graphited. Can be repacked under pressure.
- **UNION NUT** heavy, rugged. Facilitates removal and replacement without danger of distorting body or threads.
- **BEVELED JOINT** permits tighter union between body and bonnet.
- **DISC LOCK-NUT** holds disc securely to end of stem.
- **FULL-PLUG DISC and SEAT RING** stainless steel of 500 Brinell—near diamond—hardness.
- **BODY** P & C High Test Bronze. Reinforcing ribs give added strength. Heavy end hexes with standard, full length threads.





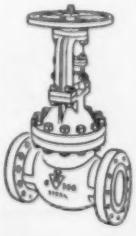


Fig. 531-P

350 lbs. Steam • 1000 lbs. OWG

Send **FOR THIS FOLDER** *which contains a detailed description of this valve. Ask for* **DH-116**

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AMERICAN CHAIN & CABLE

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Recent improvements in packaging methods and materials now make Union Multiwall Bags the preferred packaging for many different commodities . . . over 300 in all. They speed up packaging, cut labor and shipping costs, guard against contamination.

Even if you're now using multiwall bags, the Union Multiwall representative who calls on you can give you new ideas that may save you money. For he is backed by the specialized packaging knowledge of America's largest maker of paper bags—with its own forests, the largest completely integrated Kraft pulp-to-bag plant in the world, and skilled engineers and designers.

Let him show you how Union resources and packaging experience can help you!

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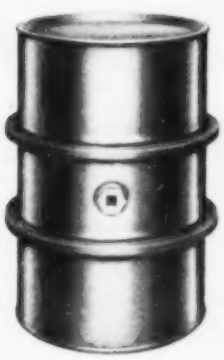
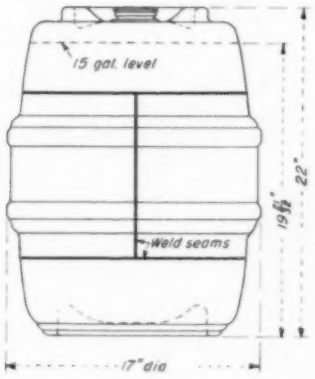
R. W. LAHEY, Editorial Consultant



Drum type stainless acid containers built by Niles will hold 15-20 gal.



Beer-keg shaped stainless container is made by Heinz to hold 15 gal.

Stainless Steel Moves Into Nitric Acid Container Business

Boxed glass carboys, accepted for many years as standard containers for most mineral acids, have proved to be economical and practical but not ideal for this hazardous service. For example, bottle breakage has been reduced by the use of more efficient cushioning materials such as rubber and by improved methods of suspending the bottle in the box, but it can never be eliminated. Other inherent objections to boxed glass carboys include high tare weight and the difficulty of handling, storing and dispensing from these containers.

Because the vapors from nitric acid are exceedingly toxic there is even more danger in shipping and handling it than most other acids. It is sometimes necessary to use this acid in congested areas such as multi-story industrial buildings where its toxic vapors, resulting from spillage or broken carboys, could prove most hazardous. This has led producers to look for stainless steel containers of approximately the capacity of glass carboys (13 gal.) and which do not increase cost prohibitively.

A substantial quantity of 8¼-gal. oxygen cylinders, used by the Air Force, have been converted to this service. Obviously this is only a temporary expedient as the cost of these pressure vessels if fabricated especially for nitric acid would rule them out.

The Metal Packages Committee of the Manufacturing Chemists' Association have been cooperating with fabricators of stainless steel containers in an effort to develop a satisfactory container for this purpose. As a result of this effort Niles Steel Products Division of Republic Steel Corp. is prepared to manufacture 15 to 20-gal. stainless steel drums. These containers are of the conventional three piece drum construction and comply with the requirements of ICC Spec. 5C. A pouring device consisting of a piece of threaded stainless steel pipe which is screwed into the single 2-in. opening is available.

Heinz Manufacturing Co. has developed a 16-gage stainless steel (Type 304) three piece inert gas shielded arc welded container that closely resembles in construction the conventional beer barrel. The single 2-in. opening is located in one head and protected by an expanded head. Tare weight is 24 lb. for the 15-gal. nominal capacity barrel —actual capacity is over 15¼ gal. The formation of the top and bottom is designed for easy handling as well as for safe stacking. The shape of the expanded rolling hoops provides maximum strength in this area. This container has passed all required tests and it is expected that the construction will soon receive ICC approval.

The Detroit Cooperage Co. have available a three piece helio arc welded container with a single head opening and with welded foot ring protection for both heads. The expanded hoops are so formed that the gage of the metal is actually increased over the top of the crown.

It is thus evident that progress is being made but it is difficult to predict at this time what the ultimate solution of this problem will be.

Tank Trucks for Resins

A 4,000-gal. capacity tank trailer containing three separate compartments is used by Plaskon Division of Libby Owens Ford Glass Co. for delivery of their liquid synthetic coating resins to paint manufacturers. Temperature of the resin is maintained at the desired level by steam heating coils and 3 in. of Fiberglas insulation surrounding the tank.

Compartments are large enough to permit entry for cleaning and are sealed by double-type domes to minimize contamination from dust and dirt. All compartments can be unloaded in 45 min. by a pump driven by a four-cylinder gasoline engine.

When fully loaded, the trailer tank weighs about 18 tons, is 45 ft. long and 9 ft. high. Safety features include shut offs for the pump located in the rear and on the top deck of the tank as well as on the front of the truck. The exhaust is equipped with a spark arrestor and valves are of the quick closing type.

Report on Container Supply

According to the report of the Department of Commerce for the first quarter of 1949 containers and packaging materials of all types are in readier supply than at any time in the last decade. They expect that the demand will be maintained at current levels throughout the summer and early autumn but thereafter further adjustments appear probable.

Shipments of glass containers in the first quarter of the year declined 22

(Continued)

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INDUSTRIAL engineers say that material handling constitutes as much as 50% of total production cost—cut handling costs and you cut production costs. Order and cleanliness—freedom from congestion — increased safety — smooth flowing coordinated movement of material or packages — these are plus advantages from Standard Conveyors in addition to their time, money, and manpower economies.

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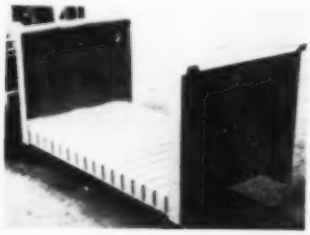


OPEN-SIDE PALLETS . . .

. . . CAN BE STACKED

Union Metal Manufacturing Co., Canton, Ohio, is offering open-side pallet racks that can be used for unit loading of fragile articles and materials of odd shapes and sizes. The pallets may be tiered ceiling-high for process storage.

percent compared with the same period last year. Likewise the shipments of closures including crowns declined.

Demand for metal cans also declined about 9 percent during the first two months from the comparable period in 1948. The leveling off trend in the demand for steel drums forecast in the previous quarterly report has since been accelerated.

Demand for small light weight gas cylinders is maintained but there has been a reduction in the requirements for the large heavier type.

There has been a general decline in shipments of all types of paper and paper board containers—corrugated and solid fiber shipping containers showed a 10 percent decline from the corresponding period last year.

There has been a decline in the output of all types of wooden containers. The same is true of the demand for burlap and cotton bags.

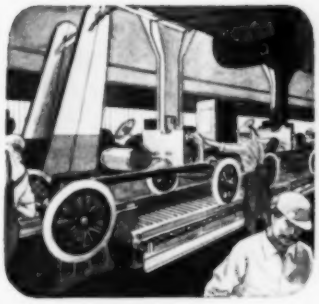
Activities of MCA's Tank Car Committee

Several projects of interest to the process industries were discussed at the meeting of the Tank Car Com-

(Continued)

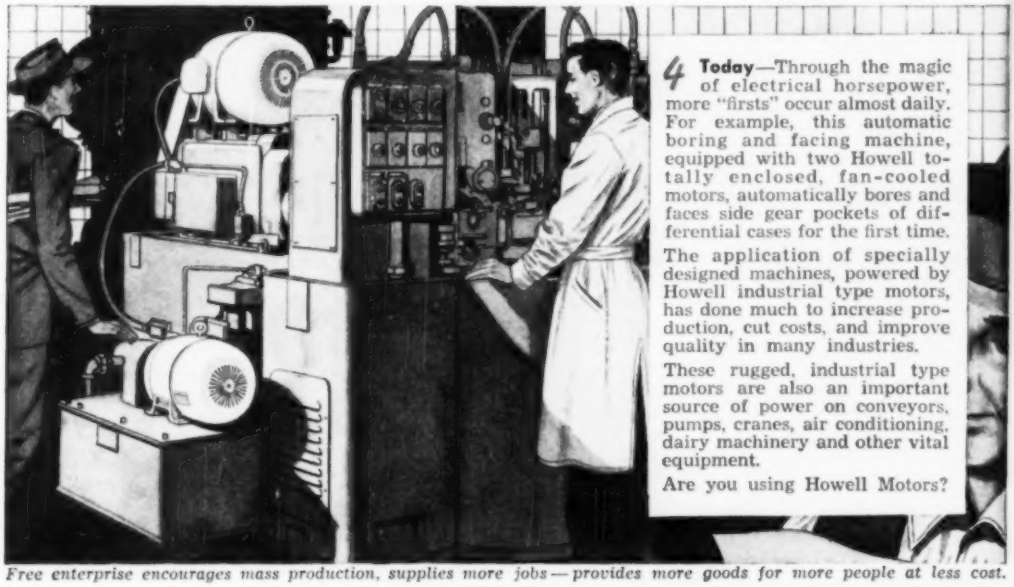
1 **1875**—Wisconsin offered a $10,000 reward to the person who would invent a steam carriage. George Seldon, Rochester, N. Y., was first and collected . . . America's great auto industry was under way.

2 **1892**—First gasoline-driven car was built by Charles Duryea with screw drivers and wrenches. Machine tools to aid this growing industry soon appeared. But parts still had to be assembled by hand.



3 **1913**—First moving assembly line was used in auto plants! Gone, now, was much of the labor of carrying parts. In 1915, Howell "Red Band" Motors appeared and soon were widely accepted in industry.

FAMOUS AUTOMOTIVE FIRSTS! REMEMBER?



4 **Today**—Through the magic of electrical horsepower, more "firsts" occur almost daily. For example, this automatic boring and facing machine, equipped with two Howell totally enclosed, fan-cooled motors, automatically bores and faces side gear pockets of differential cases for the first time.

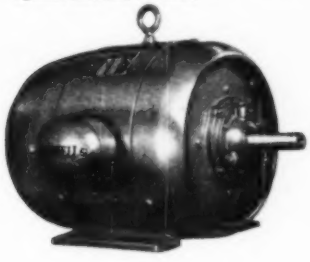
The application of specially designed machines, powered by Howell industrial type motors, has done much to increase production, cut costs, and improve quality in many industries.

These rugged, industrial type motors are also an important source of power on conveyors, pumps, cranes, air conditioning, dairy machinery and other vital equipment.

Are you using Howell Motors?

Free enterprise encourages mass production, supplies more jobs — provides more goods for more people at less cost.

Howell totally enclosed, fan-cooled motor—windings completely sealed against dirt and weather.



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Precision-built Industrial Motors Since 1915

HOWELL Red Band MOTORS

the one and only VARIABLE SPEED CENTRIFUGAL

WITH HYDRAULIC DRIVE

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Available with baskets 20" and 26" in diameter. Design permits easy interchanging of baskets. Perforate baskets with backing screens or imperforate baskets supplied as desired. Cases may be jacketed for circulation of coolant or steam. Cases may be made fumetight.

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mittee of the Manufacturing Chemists Association on June 29.

As a result of preliminary study, a Saran synthetic rubber lining for hydrofluoric and phosphoric acid tank cars has been developed. Application for experimental use in transportation of two cars lined with this material is now pending before the Association of American Railroads.

The committee is looking into the possibilities of using permanently mounted pumps on the domes of oleum tank cars. During transportation, the pump is covered with a metal casing. An experimental unit will be placed in service when application is approved by the AAR.

A petition has been filed to again defer for one year the regulation by the ICC making it mandatory to install AB power brakes by Jan. 1, 1950, on all railroad equipment including privately owned tank cars.

A proposed specification for portable skid tanks to be used for transporting corrosive liquids on stake body trucks has been agreed upon and it is expected that it will be adopted in the near future by the ICC as a specification container.

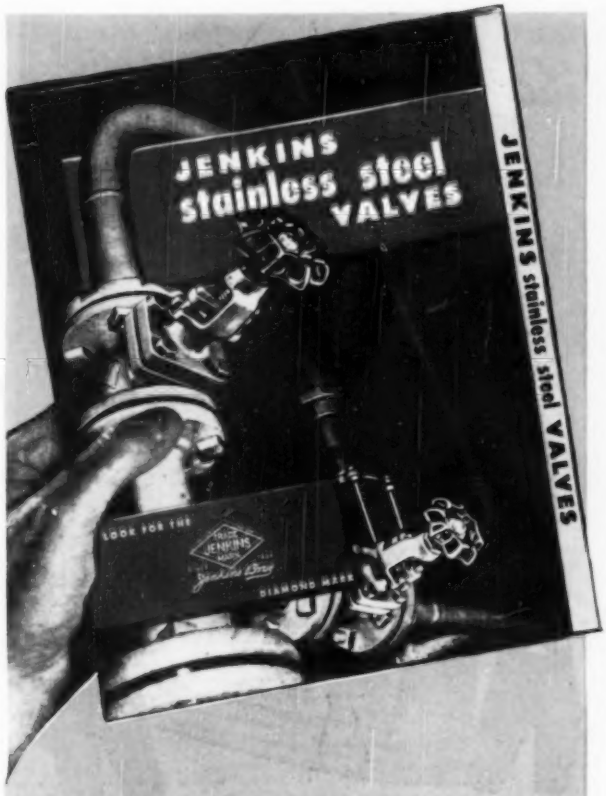
Additional proposals of the committee include a recommendation for shipment of hydrobromic acid, maximum strength 49 percent in rubber lined tank cars (ICC Spec. 103B) and a request for permanent approval for use of aluminum tank cars for transporting nitric acid of not less than 95 percent strength. These aluminum cars have been in service since 1939, operating under experimental authorization of the ICC.

R. W. Parker, Tennessee Copper Co., who was elected chairman, as well as MCA representative on the AAR committee, has been a member of the committee for many years and is an expert on tank car construction and maintenance. He replaces H. J. Gronemeyer of Du Pont who has been chairman for 16 years and served as the Association's representative on the Tank Car Committee of the AAR. Mr. Gronemeyer will continue as a member of the Committee.

Anti-Bug Glue

According to reports, packages fabricated from or wrapped with repellent stocks and sealed with adhesives formulated with piperonyl butoxide will resist the attacks of boring insects including confused or sawtooth beetles. This new adhesive has been developed by National Adhesives in collaboration with U. S. Industrial Chemicals Inc.

—*End*



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JENKINS Stainless Steel VALVES

Built to the same quality standard that makes any Jenkins Valve your best buy.

You know it pays — and pays well — to use Jenkins Bronze, Iron and Steel Valves. In industry after industry, these valves bearing the famous Diamond trade-mark have set records for long, trouble-free service and low upkeep cost.

You'll find the same Jenkins quality built into Jenkins Valves of Stainless Steel. Service records show many years of faultless operation in the control of highly corrosive fluids, and liquids which may become contaminated or discolored by contact with other metals.

More and more Stainless Steel Valves have been added to the Jenkins line as the need has developed in such industries as food processing and packing, chemical, textile, petroleum, pulp and paper, and rubber. Today it includes Gates, Globes, Angle, "Y" and Check Valves in a range of sizes to answer most requirements.

A new data folder just off the press, describes the complete line of Jenkins Stainless Steel Valves, and contains valuable information on selection of the proper alloy for the service.

If your plant handles corrosive liquids, or fluids that must be kept absolutely free from contamination or discoloration, you will want this new Data Folder. Ask for Form 194. It will help you select the right Stainless Steel Valve for your requirements. Write for a copy today.

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Only Acme Sulphur Burners Provide ALL 3 BASIC REQUIREMENTS

1. CONTROLLED, UNIFORM PRODUCTION OF SO_2
2. COMPLETE COMBUSTION
3. CONTINUOUS OPERATION

An ordinary sulphur burner, which burns solid sulphur on a tray or rotating cylindrical surface, cannot provide a definite, constant burning rate. Since ordinary sulphur contains a small percentage of organic matter, this matter accumulates as a carbonaceous scum on the surface of the burning sulphur, and gradually extinguishes the fire. In order to overcome this factor the Acme Sulphur Burner is operated at a controlled rate sufficient to burn off this scum. Also, in an ordinary burner, the addition of a fresh charge of sulphur to the burning surface disrupts the burning rate for several hours. The Acme Sulphur Burner has a special feeding device that feeds melted sulphur to the burner in a manner that does not disturb the burning surface, at the same time maintaining a constant level of burning sulphur. Thus, uniform production, complete combustion, and continuous operation result.

The Acme Sulphur Burner will operate equally well under pressure or vacuum, and the manufactured gas can be discharged directly to the absorbing apparatus. Efficient operation results either for single burner or battery operation. Where required for large scale production, automatic operating controls can be furnished.

OPERATING PROCEDURE

Solid sulphur is charged into the hopper of the melting chamber, around which live steam is introduced at about 25 pounds gauge pressure (if steam is not available, an electric heating element is supplied). The melted sulphur is fed to the combustion chamber by means of the feeder, which automatically maintains the correct level. Compressed air, or air furnished by a blower, is used for combustion. The quantity of air supplied regulates the concentration of SO_2 produced.

Since the introduction of the feed is below the surface, the burning area is never disturbed. This, together with the unchanging level of molten burning surface, and a controlled air supply, guarantee a constant burning rate and thereby a uniform production of SO_2.

ACME
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Men, Machines and Methods

ROGER WILLIAMS, JR., Assistant Editor

Representative Poage
"somebody pays it"

Phillips' Jopling
"we are paying it"

You Can Do Business in Washington, But It Is a Mighty Confusing Business as Phillips Chemical Found Out

The Phillips Chemical Co. and the agriculture committee of the House of Representatives certainly got itself involved last spring. The Army, the Department of Commerce, the Chinese, the Japanese, and sundry companies got into the picture. The representatives were confused and we still are.

Perhaps the story indicates that "you shouldn't do business in Washington." More probably it indicates that doing business in Washington is a frustrating, confusing business. In any event, the Phillips experience is one chemical manufacturers should know about before they start for the capitol city.

The story began when Phillips leased the Cactus Ordnance Works from the Army—leased it so they could get into the ammonia business. Then Phillips built themselves an ammonium sulphate plant. The idea, it seems, was to use this plant to convert the ammonia made at Cactus. So far, so good.

The trouble started with the terms of the lease. It seems that Phillips leased the plant for a rental of roughly $1,000,000 a year. More than that the Army got an option to buy all the Cactus production for four years. But suppose we give it to you in the words of Phillips' Mr. Jopling and the members of the Subcommittee on Fertilizer and Farm Machinery:

Mr. Jopling: "We have a peculiar sort of a lease that on all of the material that is sold to the Army, we pay no rental, and then we have a special price to the Army on the material that we produce at the plant. . . The contract on part of the material is based upon the Army's cost at the time they were running the plant. In other words, we operate the plant and pay taxes and insurance and all of those things, but we must sell them the material at the same price it cost them to make it under their own operation when they were operating."

Representative Poage: "You are betting you can produce a great deal cheaper than the Army did, are you not?"

Jopling: "If we are going to make money, we will have to."

Poage: "I assume you can. I have seen few instances where that was not possible. . ."

There were other things about the lease that got the representatives and us confused. Seven-dollar-a-ton kickbacks to the Army. Other companies buying ammonia for $75 a ton, paying freight, and then reselling the same ammonia for $75 a ton. But the real confusion came last spring. That's where the Chinese come into the picture too.

It seems that Congress required the Army to supply 50 percent of the nitrogen exported to non-occupied countries and also to make available 10 percent of its production for domestic use, distribution to be at the direction of the Department of Commerce.

Early last spring things looked simple. The Department of Commerce had told the Army, and the Army had told Phillips that it was to ship 97 cars of ammonia to domestic producers and 51 cars to Salem, Ore., for export. Then all of a sudden the Department of Commerce cancelled the 51 car order, but did not release the ammonia to be sold elsewhere. At the same time the domestic producers couldn't take the 97 cars. Poor Phillips was left with full storage tanks and had to shut down its ammonia plant.

Jopling: "One cause of the cut-back was the failure to allocate material in the second quarter."

Poage: "Whose failure, the Department of Commerce's?"

Representative Abernethy: "Do you mean the failure, or the delay in allocation?"

Jopling: "The Department of Commerce just did not do it. I think it was a delay because of the Chinese being late placing their order. But according to the shipping schedules or the allocation schedules set up by the Department of Commerce, there were some 97 cars that would have been moved in the second quarter. They allocated 51 cars to this concern out in Salem, Ore., and then for some reason or other cancelled it. That was 146 cars that piled up in our storage because it was not moved.

"So far as those who failed to take the material is concerned all agreed to take it, but where the trouble was they could not take it at the time we had to ship it in order to keep the plant going. . ."

Poage: "Let us make that clear. The

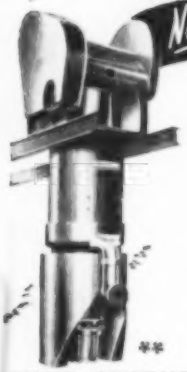
(Continued)

J&C

Zenith Continuous Pulp Presses
Now Available in 3 Models

New ZM Press

The ZM Continuous Pulp Press is the answer to the demand for a press of smaller capacity, but retaining the high efficiency and all of the outstanding features of the parent press.



ZL Press

Zenith* Model ZL Pulp Presses are being used for dewatering, beet pulp, pineapple, tomato pomace, corn germ and fibre, vegetables, brewers grain, cherries, citrus fruits, fish, paper pulp, and many other materials, assuring a direct cake of uniform consistency.

100% continuous . . . from storage bin to pressed cake, the ZL Press dewaters *up to 26 tons of wet pulp per hour.*

Model ZP . . . our smallest press with less capacity than the ZM or ZL but having a very high efficiency.

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CABLE-VEYOR
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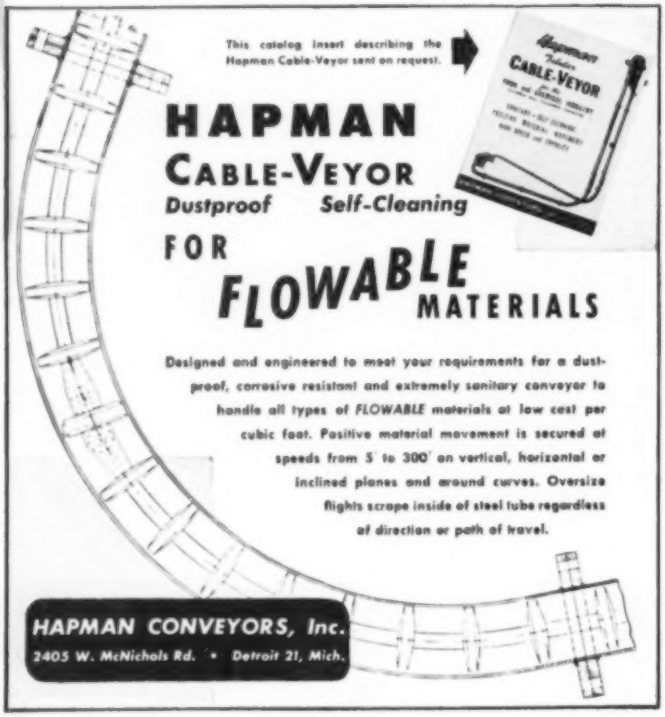
FOR FLOWABLE MATERIALS

Designed and engineered to meet your requirements for a dustproof, corrosive resistant and extremely sanitary conveyor to handle all types of *FLOWABLE* materials at low cost per cubic foot. Positive material movement is secured at speeds from 5' to 300' on vertical, horizontal or inclined planes and around curves. Oversize flights scrape inside of steel tube regardless of direction or path of travel.



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M M & M, *cont. . .*

other companies not only refused to take this extra 52 cars that the Department of Commerce dumped in your yard, but they refused to take the 85?"

Jopling: "That is not correct. These 51 cars were allocated to Columbia Metals out in Salem, Ore., and when they were cancelled they were frozen by the Department of Commerce. It did not allocate them to anybody. We just had to keep them in storage."

Poage: "How long did they set in your yard?"

Jopling: "They are still there."

Poage: "Loaded?"

Jopling: "This material is not in cars, but it is in storage there."

Poage: "You never actually loaded those cars, then?"

Jopling: "No; Columbia Metals, of Salem, Ore., I think, filed an appeal and I have information that they won it, so we may start shipping this ammonia any time now. . ."

Poage: "And in the meantime you are storing the stuff. Who is paying the storage on it?"

Jopling: "Nobody is paying it. We are paying it."

Poage: "Somebody pays it."

So now, the representatives wanted to know whether Phillips had a clause in the contract to make the Army take the ammonia or pay storage.

Poage: "Then your agreement with the Army just says in broad terms, 'If you will let us sell to these people, we will pay you 5? a ton'?"

Jopling: "Yes."

Poage: "And that is as far as you went with the Army? You did not get down to details?"

Jopling: "Oh, yes; we got down to details. They said we could not sell above the market, but they did not tell us what the market price was. That is about all there was to it."

Poage: "I never did see a government contract that did not have about 16 pages of fine print. While I have never dealt with the Phillips Chemical Co., I have dealt with the Phillips Oil Co., and I never did see the Phillips Oil Co. write a contract that did not have at least about a full page of very fine print in it."

Jopling: "This was a supplemental contract that we made, and being a supplemental contract, it was boiled down to about 9 or 10 pages."

Poage: "It looks like in those 9 or 10 you would at least have made some provision as to when this material would be moved out."

Jopling: "The cars move out as the Army directs us to move them."

Poage: "And you agreed to go on

(Continued)

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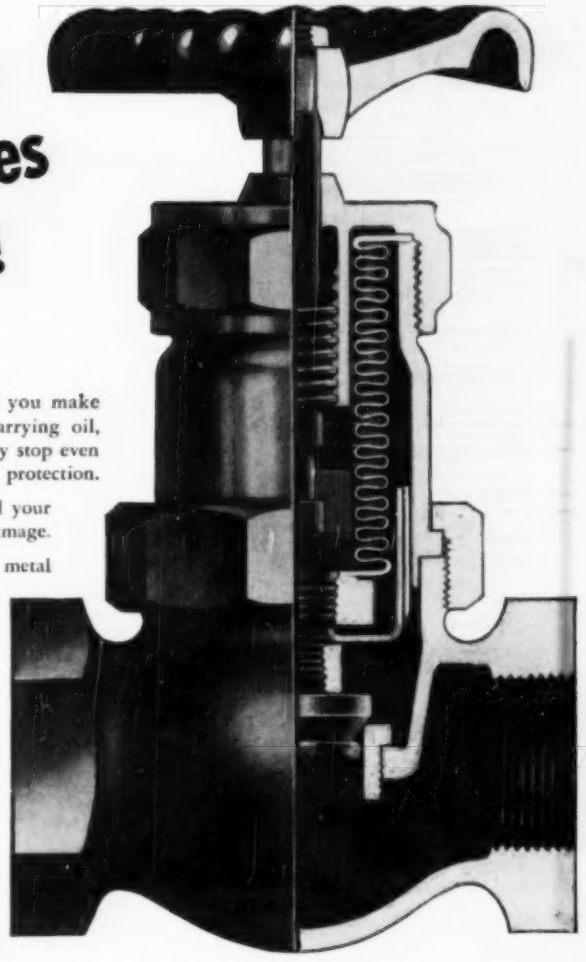

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M M & M, cont. . .

manufacturing every day and to move it out only when the Army gave you orders to move it out, and the Army did not agree to give you any orders to move it out at all? . . . And then the Army could just leave you sitting there during the whole period of the contract, and material would just be piling up, unless the Army issued an order, and you would not collect from it, and you would have no income coming in from it, and you would have no way of forcing the Army to issue that order."

Jopling: "In the big contract, which is about 90 pages, we have a clause which says that the Army will take this stuff in regular quantities, and more or less even quantities. But if they did not do it, we have to go to another clause that is a settlement clause whereby we have to have several appeals and then finally wind up with the Secretary of the Army making a decision. We do have some relief under it, though it is rather cumbersome. . ."

Poage: "So that you may recoup some of your losses for the storage you provide there over the course of time?"

Jopling: "I doubt that it would be worth trying to get."

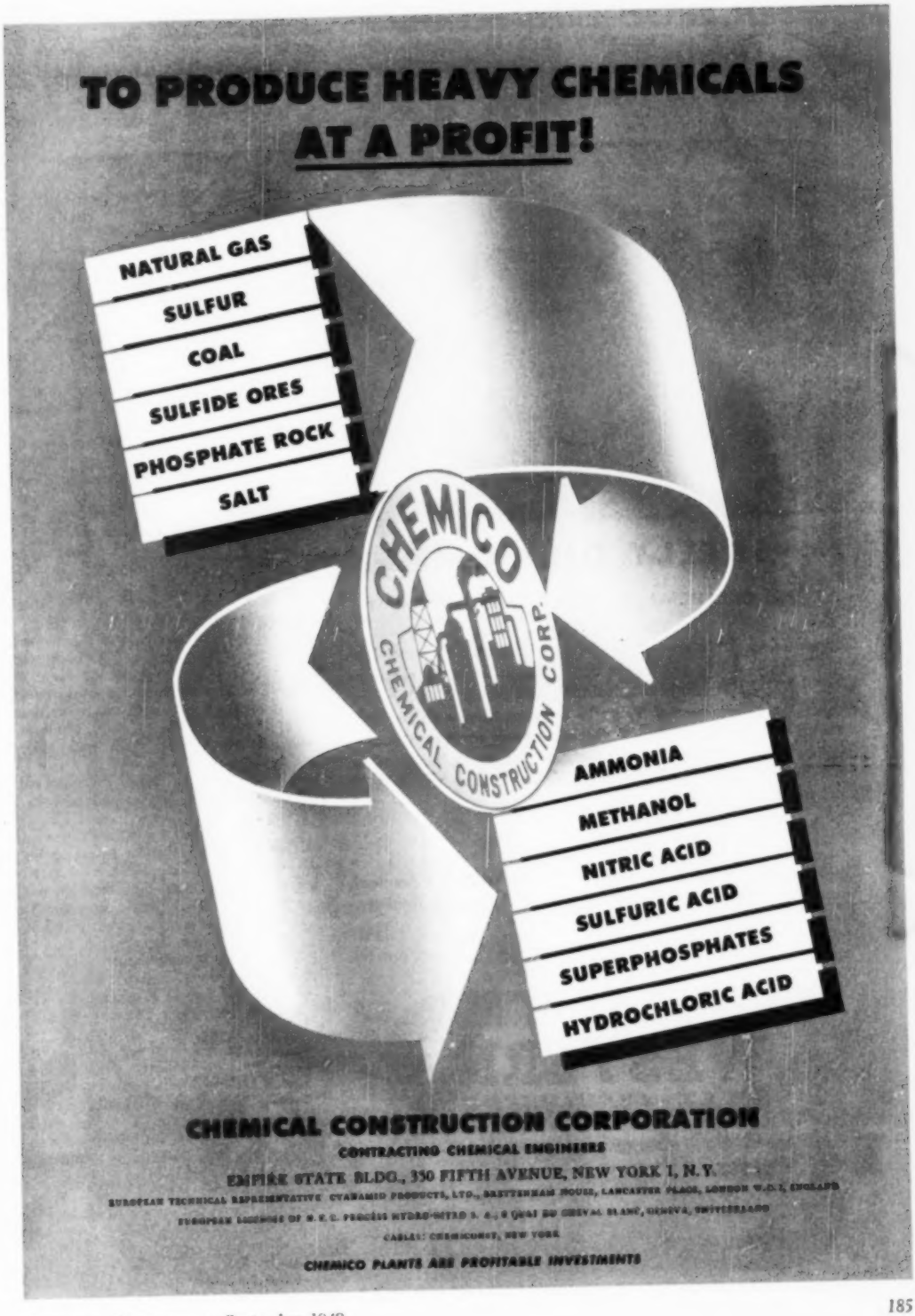
Poage: "I doubt it too, because you are really running up against something when you try to collect from the United States Government on anything."

That section of the discussion seemed to worry the representatives more than it did Phillips. What had Phillips hopping mad was that they could not use this ammonia in their ammonium sulphate plant at Houston. Here is the testimony:

Jopling: "I want to talk a minute about our sulphate plant down at Houston. At the time we leased this plant at Cactus and doubled its capacity we bought a site on the ship channel at Houston, the old Todd shipyard, and have built and are now operating a sulphate plant that will produce about 250,000 tons a year. Because of these Army contracts the only ammonia that we could get to run it with under allocation was either from the 50 percent program or the 10 percent program.

"We went out and got some orders under this 50 percent program. We got part of the Chinese and Greek orders and the Department of Commerce allocated us this material.

"During the time that our plant was cut back and our storage was full at Cactus our first order from the Chinese was for 7,500 tons requiring 75 cars of ammonia. (Continued)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M M & M, cont. . .

"We had our ammonia production backing up at Cactus, and naturally wanted to ship our own material down to Houston, which is earmarked for the 50 percent program, but instead we had to go out and take a C. X. N., which is a priority to purchase, and we had to buy the whole 75 cars from private industry other than ourselves."

Abernethy: "In other words, you could not use the ammonia that was produced in your own plant to produce sulphate at your other plant?"

Jopling: "That is right. I am speaking of these first 75 cars.

"When you get one of these C. X. N.'s it is sort of a hunting license. You have to find someone who will ship you. After arguing with every other one of these primary producers, we finally bought the 75 cars. . ."

Poage: "You paid $85 for that, did you not?"

Jopling: "There is one particular company that we served the priority on who had some 33 cars. . . They said yes, they would accept the order, but for $85 a ton. That was, at the time, about $10 a ton above the market.

"We had to have it, and we wanted to run, so we bought it.

"Not very much later the Department of Commerce came along with this repayment thing. We were ordered to ship the same company 29 cars. We have to sell our material no higher than the market, which we determined at that time to be $75 a ton.

"So the net effect of it was we paid $85 a ton for 33 cars and sold them 29 cars for $75 a ton. . . .

"The thing I am calling to your attention is what seems to me to be a ridiculous situation. When we have to buy 33 cars from them and then sell them 29, that seems unreasonable. Why did we not leave the 29 and buy four cars from them? It is this pay back I am talking about."

Abernethy: "Business is not often done that way in Washington. That would be entirely too easy, Mr. Jopling."

We're still confused, but a little sorry for Phillips. Mr. Jopling summed up Phillips' plaint when he said, "Our desire to get into this business as a competitor without being forced to sell our material to whomsoever the government says to sell it to, at the price these other companies set for the market, is understandable. We want to run our own business, and sell our own material, and put our own price on it."

Maybe Phillips needs a five-per-center. —*End*

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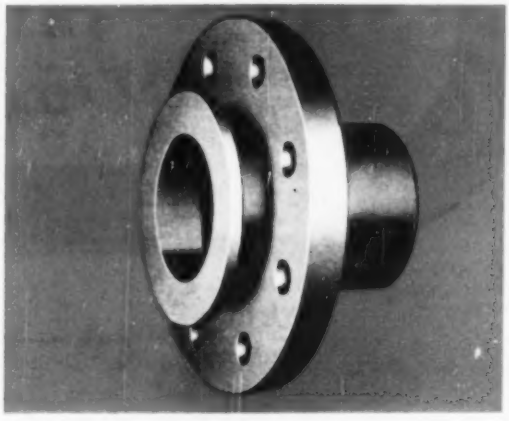

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Chemical Engineering News

RICHARD F. WARREN, *Assistant Editor*

New Process Cuts Cost Of Producing Caffeine

Economics resulting from successful production of caffeine on a commercial scale by a new process have permitted the Monsanto Chemical Co., St. Louis, Mo., to reduce substantially the price of that chemical.

The reduction amounts to $1.00 a lb. for anhydrous caffeine and a proportionate reduction of 95c. a lb. for hydrous caffeine. Monsanto's new price schedule is $4.00 a lb. for anhydrous and $3.80 a lb. for the hydrous product.

Behind the price cuts, according to W. G. Krummrich, general manager of Monsanto's Organic Chemicals Division, were these factors: (1) investment of several million dollars in research, development and manufacturing facilities; (2) successful operation of a new manufacturing process for caffeine which frees the product from dependence on the irregularities of foreign sources of raw materials; and (3) demonstrated production economies which enable the company to pass on the savings to the consumer.

Caffeine produced by the new process more than meets current USP standards and is fully equivalent or better than anything produced by other methods.

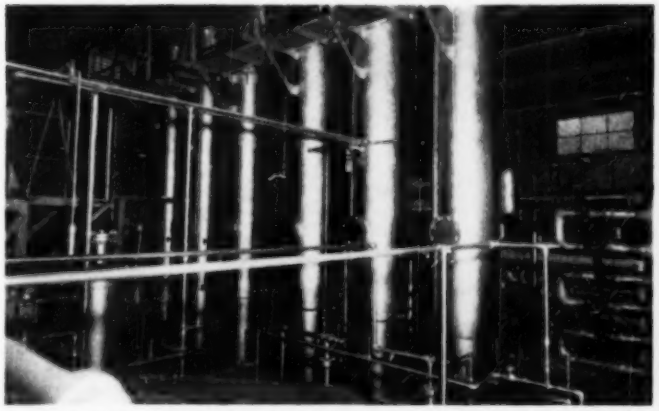
The new operation at St. Louis is the world's first large-scale plant for the manufacture of caffeine by a modified and improved process. It marks a new and important application of organic chemistry.

Virginia-Carolina Enters Multiwall Bag Field

Opening of its new textile and paper bag plant in Atlanta, Ga., heralds the entrance of the Virginia-Carolina Chemical Corp. into the multiwall paper bag field.

Appointed southeastern district manager is Ernest R. Lacy, formerly of Richmond, Va., who will now have his headquarters in Atlanta. Harold R. Stemple is superintendent in charge of operations at the new plant.

In addition to the multiwall paper bags, Virginia-Carolina will also manufacture burlap and cotton bags in the Atlanta unit.



Interior of refinery treating unit at the oil-shale demonstration plant near Rifle, Colo., which the Bureau of Mines just put in operation.

Synthetic Liquid Fuels Made From Crude Shale Oil As Bureau of Mines Puts Pilot Plant On Stream

First continuous shale-oil refinery in the U. S., the new 200-bbl.-a-day experimental unit of the Bureau of Mines near Rifle, Colo., has been put on stream successfully. All of the Bureau's installations near Rifle—the mine, retorts and refinery—will be on exhibition September 20 and 21, the midway point in a month-long oil-shale mining demonstration.

A highly flexible, continuous unit, the refinery is designed to produce gasoline, diesel fuel, heating fuels and fuel gas from crude shale oils extracted at the Bureau's oil-shale demonstration plant. It was built under contract with the Refinery Engineering Co., Tulsa, Okla., at a cost of $244,912.

Commercial utilization of the nation's gigantic oil-shale resources is a three-fold problem. It involves: (1) mining the shale; (2) retorting the shale to produce oil; and (3) refining the crude shale oil into useful products. Operation of this new experimental unit under the bureau's synthetic fuels research and development program is expected to answer for private industry some of the technical and cost questions of shale-oil refining. The mining problem has been largely solved, for the bureau's experimental oil-shale mine already has achieved low-cost production. Work on the retorting problem is well advanced, with research now concentrated on a pilot-plant retort designed for continuous operation.

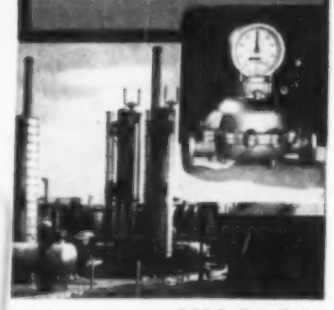
As designed and built, the new experimental refinery is of the minimum size that will provide the desired information about shale-oil refining, including the operating characteristics and costs.

Major pieces of equipment include a furnace or heater, two coking chambers, a combination flash vaporizer and fractionator, stripper for the diesel fuel fraction, stabilizer for the naphtha fraction, absorber and a re-run column for acid-treated gasoline. With only minor changes, the same equipment can be used for atmospheric distillation, delayed coking, single-coil recycle cracking or reforming. Facilities also are available for chemical treating of distillates.

In both function and design, the fractionation section is conventional. Heavy fuel residuum is withdrawn from the flash vaporizer at the base of the fractionating tower. Gas oil and diesel fuel are taken off as sidestreams from the fractionator, and the diesel

(*Continued*)

Meter
CORROSIVE LIQUIDS



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fuel is stripped of its light components before being stored. The gasoline fraction is taken overhead as a vapor and condensed. Uncondensed gases go to the absorber where the condensible hydrocarbons are recovered and returned to the fractionator. Condensed gasoline is pumped to the stabilizer for removal of excess quantities of butanes and lighter hydrocarbons, and the stabilized gasoline then is sent to the chemical treating unit.

In the treating unit, the distillate first receives a dilute caustic wash for the removal of hydrogen sulphide, light mercaptans and tar acids. This is followed by a dilute sulphuric acid wash for the removal of nitrogenous compounds, commonly called tar bases. Thus freed of its chemically active compounds, the distillate then undergoes three stages of countercurrent extraction with concentrated sulphuric acid for sulphur removal, improvement of color and oxidation stability. Next it is washed with water and neutralized with a final dilute caustic treatment. Following chemical treatment, the distillate is redistilled to remove the polymers formed in acid-treating, and the specification end-point distillate is returned to the treating plant for "doctor" sweetening.

Pennsalt HF Plant Running In Western Kentucky

Now up and running is the new $2 million chemical plant of the Pennsylvania Salt Manufacturing Co. at Calvert City, Ky. Hydrofluoric acid, to be produced at the plant, plays a vital role in the development of atomic energy.

"Thus does fluorine chemistry stand at the forefront of the jet-propelled, atom-powered new age which is unfolding before us," declared Pennsalt's President George B. Beitzel to nearly 1,000 persons present at the plant's opening.

The hydrofluoric acid, from which fluorine is generated, is made from fluorspar mined in the western Kentucky and southern Illinois area. Proximity of the raw material and the central geographical location of Calvert City were important factors behind Pennsalt's move there.

In addition to offices, a laboratory and a warehouse, the Calvert City installation includes a sulphuric acid plant and the hydrofluoric acid unit. Its advent promises a shot in the arm for the economic life of western Kentucky.

Superintendent of the new works is James McWhirter. The plant will employ 50 people from the Calvert City-Paducah area during its initial stages, and will operate 24 hr. a day.

New $1 million plant of Tennessee Products & Chemical Corp. at Chattanooga, Tenn., expected to be operating in the near future.

Organics Soon to Come From New Tennessee Plant

Benzoic acid, benzyl alcohol and other chemicals will soon be coming from the new $1 million plant of Tennessee Products & Chemical Corp. now nearing completion in Chattanooga, Tenn. To be one of the most modern chemical plants in the South, the new unit will get its raw materials from the neighboring coking plant of Tennessee Products.

When all facilities are installed the new plant will also produce esters and chlorinated products.

An explosion occurred recently in a building of the nearby old plant. Benzene hexachloride was being produced there, and it is believed that

benzene vapors caused the explosion. However, benzene hexachloride will not be made in the new plant.

Present plans are to rebuild the destroyed unit and to install new equipment in it for chemical production.

Celanese Gets Award For Postwar Achievements

Celanese Corp. of America is the winner of this year's Award for Chemical Engineering Achievement. When all votes of the Award Committee were counted, Celanese led the field of nine companies competing for the prize. This has just been announced by the committee chairman, Alfred H. White, professor-emeritus of chemical engineering at the University of Michigan, Ann Arbor, Mich. Prof. White's committee comprises the senior chemical engineering educators of the U. S. The announcement marks the tenth time that the award, sponsored by *Chemical Engineering*, has been bestowed upon an organization or group of organizations for an outstanding achievement in chemical engineering. Celanese got the award for its postwar advances in the chemical, plastics and textile fields, all achieved through the teamwork of its chemical engineers.

Keystone of the Celanese development was the pioneering work it did in the oxidation of petroleum hydrocarbons. This led the company into production of alcohols, aldehydes, ketones, acids, ethers, oxides and glycols by direct air oxidation of petroleum natural gases. These chemicals are made at the Chemcel plant near Bishop, Tex. Highlight of the development program during 1949 was large-scale production of flake formaldehyde. In addition, isobutanol and n-butanol production has been initiated, and volume output of propylene glycol is getting under way. Up in Canada, meantime, Celanese is pushing a project in British Columbia that will open for it a new source of cellulosic raw materials.

Presentation of the award will be made at a subscription dinner to be held at the Waldorf-Astoria Hotel in New York on Thursday, December 1, 1949.

Sweet Profit In Sulphur From Sour Gas Tempting

To get sulphur from "sour" natural gas, the Texas Gulf Sulphur Co., biggest U. S. producer of sulphur, is soon to start operating a $3 million plant at Worland, Wyo. The plant will get its natural gas from the

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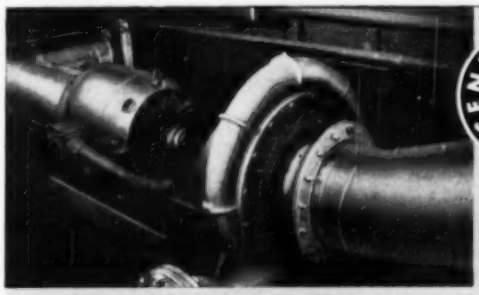
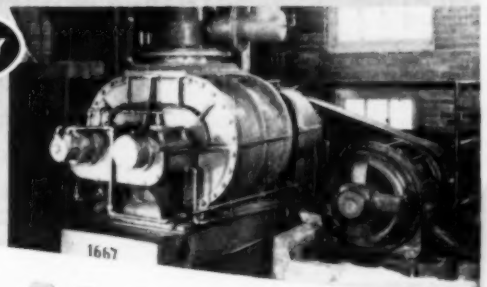


R-C Centrifugal Blower, type OIB, in foundry service. Capacity 6,000 CFM, at 21 oz. pressure.

ROTARY



R-C Rotary Blower, type RCD, capacity 6,200 CFM.

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RESEARCH REPORT

NUMBER THREE

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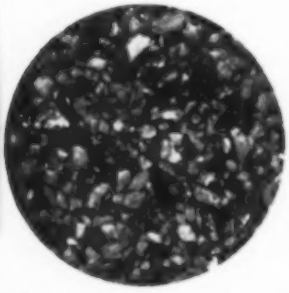
The efficiency with which Sutton equipment was used here to recover clean mica from material composed of mica and gangue also emphasizes the engineering and economical feasibility of applying the S S & S Process for the *separation of virtually any type of dry granular particles from a component of varying bulk density.*

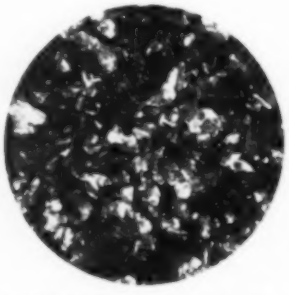
Check into your *own* plant operations with imagination. Sutton equipment is doing a big job for virtually every type of industry. It could be your answer, too.

**Unretouched photographs taken during pre-delivery tests.*

"CRUDE AS RECEIVED" was composed of mica and gangue. Bulk of the material ranged from ¾" down to + 20 mesh.



PRODUCT NO. 1, consisting of gangue particles, was separated out at the "heavy" end of the Specific Gravity Separator deck.



PRODUCT NO. 4 consisted of clean particles of mica, and was removed at the "lighter" end of the Separator deck.

LITERATURE AVAILABLE

Tell us about your separating problem. Let us check it against our testing laboratory records which cover hundreds of successful separations. In the meantime, we will forward literature giving a general description of the S S & S Process. Address information to:

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Foreign: Winnipeg, Canada; San Paulo, Brazil; London, England.

NEWS, *cont. . .*

Pure Oil Co., and it will take about 300 tons a day of sulphur out of the sour gas. Hydrogen sulphide content of gas produced in that part of Wyoming is often as high as 35 percent. Continuing heavy demand for sulphur tempted Texas Gulf Sulphur for the first time to invade the West.

Texas Gulf's sulphur wells at New Gulf, Tex., south of Houston, produces some 2 million tons of native sulphur a year, about 70 percent of the total production in Texas. In turn, the Texas total amounts to over 75 percent of the entire U. S. output of native sulphur.

Alcoa Unit Streamlines Production Of Fluorides

Just going into full-scale commercial production of fluoride chemicals is the ultra-modern plant of the Aluminum Ore Co. at East St. Louis, Ill.

(Continued)

CONVENTION CALENDAR

American Chemical Society, 116th national meeting, Atlantic City, N. J., September 18-23.

American Society of Mechanical Engineers, petroleum division, engineering conference, Oklahoma Biltmore Hotel, Oklahoma City, October 2-5.

Electrochemical Society, semiannual meeting, Chicago, Ill., October 12-15.

American Association of Textile Chemistry and Colorists, annual meeting, Chelfonte-Haddon Hall, Atlantic City, N. J., October 13-15.

American Gas Association, annual convention, Chicago, October 17-21.

Drug, Chemical and Allied Trades Section, New York Board of Trade, Inc., 59th annual meeting, Shawnee Inn., Shawnee-on-Delaware, Pa., October 22-25.

Packaging Institute, annual forum, Commodore Hotel, New York, October 24-26.

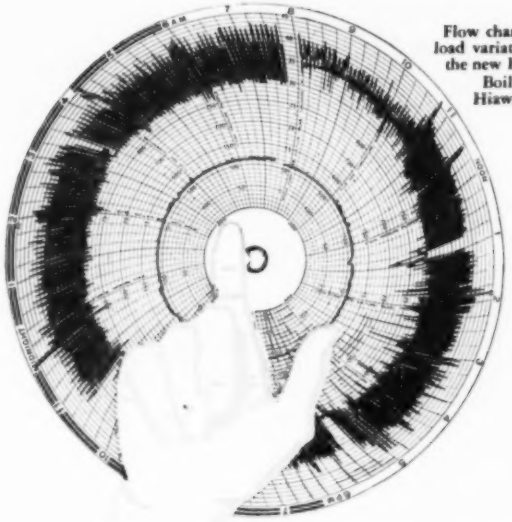
Technical Association of the Pulp and Paper Industry, engineering conference, Statler Hotel, Boston, October 29-November 3.

Second Pacific Chemical Exposition and Industrial Conferences, Civic Auditorium, San Francisco, November 1-5.

22nd Exposition of Chemical Industries, Grand Central Palace, New York, November 28-December 3.

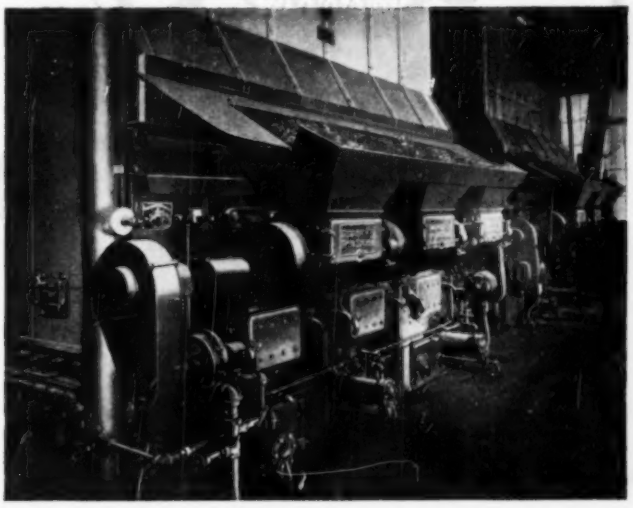
American Institute of Chemical Engineers, annual meeting, William Penn Hotel, Pittsburgh, Pa., December 4-7.

First Plant Maintenance Show, Auditorium, Cleveland, January 16-19.



Flow chart shows typical load variations for one of the new Integral Furnace Boilers, Type FF, at Hiawatha Gas Plant.

Two Integral-Furnace, Type FF, Boilers arranged to burn either bituminous coal or coke breeze, mixed, or 100% of either at full load, intermittently.



PUTTING THE INDIAN SIGN ON LOAD SWING

... with B&W Integral-Furnace Boilers at Hiawatha Gas Plant

Typical of how the B&W Integral-Furnace Boiler, Type FF, responds to quick-steaming and severe load-swing demands is the performance of two 35,000 lb. per hr. units at the Hiawatha gas-plant of the Central New York Power Corporation of Syracuse, N. Y. Each boiler successfully meets three-minute load variations of 8,000 to 12,000 pounds per hour instantaneously, up or down ... responds to the irregular quick-steaming demands characteristic of gas plant operation.

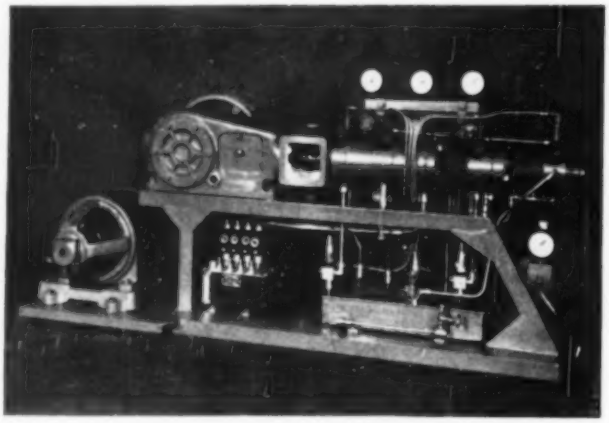
Ability to satisfy Hiawatha's unusual load and fuel requirements is just one of the many reasons why so many industrial and power companies consider B&W boilers the best buy for low-cost, dependable steam generation. Their industry-wide acceptance for power, heating, and process steam requirements is an 80-year-old story ... yet one that is continually being revised to meet changing practices and needs. One chapter in this story which answers many steam supply problems is presented in a new bulletin of facts about the Integral-Furnace Boiler, Type FF. Ask for Bulletin G-64.

The Babcock & Wilcox Company, 85 Liberty St., New York 6, N. Y.

B&W BABCOCK & WILCOX

G 422

Norwalk Announces



SEMI-PORTABLE HIGH PRESSURE COMPRESSOR

Designed for laboratories, pilot plants, and wherever pressures up to 6000 pounds are required in relatively small volume. A four-stage compressor complete in every respect, this unit is built entirely of steel or non-corrosive materials. Handles any gas that can be pumped. Descriptive literature available on request.

N

NORWALK COMPANY, INC.

SOUTH NORWALK, CONNECTICUT

Manufacturers of High Pressure Compressors for Air and Gases for more than 80 years

Aluminum Ore Co. is a wholly-owned subsidiary of the Aluminum Co. of America. The new plant, capable of producing 10 million pounds of fluorides a year on one-shift operation, replaces smaller, less efficient facilities at the Aluminum Ore Co.'s East St. Louis works.

Representing an investment of about $1 million, the modernization program is expected to improve substantially the products and reduce the costs of production.

Fluorspar for the production of the fluorides is found in deposits at nearby Rosiclare, Ill., where it is mined and purified by Alcoa.

Full production of fluoride chemicals is just getting under way. Until now, quality control was being established and the new equipment tested in preliminary stages of production. The new plant is highly streamlined. Controls for many phases of production are operated from a central station.

Principal products of this new plant are sodium fluoride, sodium bifluoride and high-strength hydrofluoric acid. Plant facilities, however, permit the manufacture of other fluoride chemicals as the need arises.

First Step Taken To Give More AEC Data To Industry

Atomic Energy Commission has taken the first step toward the release of atomic energy technological information to American industry. A trial program for examining, evaluating and declassifying selected technological information in the field of metallurgy has been inaugurated. If this trial program in metallurgy works out, the commission can be expected to apply the procedure to other fields.

As the first move, a temporary advisory committee of representatives of professional societies and the business press has been set up. Chairman of this committee is Sidney D. Kirkpatrick, editor of *Chemical Engineering* and vice president of the McGraw-Hill Book Co.

This advisory group will recommend members for a small working party of engineers, representatives of professional societies and business press members from metallurgical publications. The working party will study information which could be declassified without risk to the atomic energy program. Special attention will be given to data on pumps, blowers, valves and techniques for handling metals.

From the information made avail-

(Continued)

Easy as fixing a faucet

THE GRINNELL-SAUNDERS DIAPHRAGM VALVE has only one part that normally wears and needs replacement . . . the diaphragm. Depending on the type of service, it may last for years or only months. It can be replaced in just a few minutes. The valve body doesn't have to be removed from the pipe line . . . only the bonnet. The new diaphragm is attached to the bonnet which is then bolted back onto the valve body . . . and the valve is restored to service. That's all the maintenance a Grinnell-Saunders Diaphragm Valve normally needs. No packing glands to demand frequent attention. No refacing or reseating required, because there are no metal-to-metal seats to become damaged or wire drawn.

SIMPLE, POSITIVE OPERATION . . . Flexible diaphragm opens wide for streamlined flow, pinches tight for positive closure even when grit, scale or other solid matter is trapped on the weir.

NO CLOGGING . . . MINIMUM RESISTANCE TO FLOW . . . Smooth, streamlined fluid passage without pockets prevents accumulation of sludge and reduces friction resistance to a minimum.

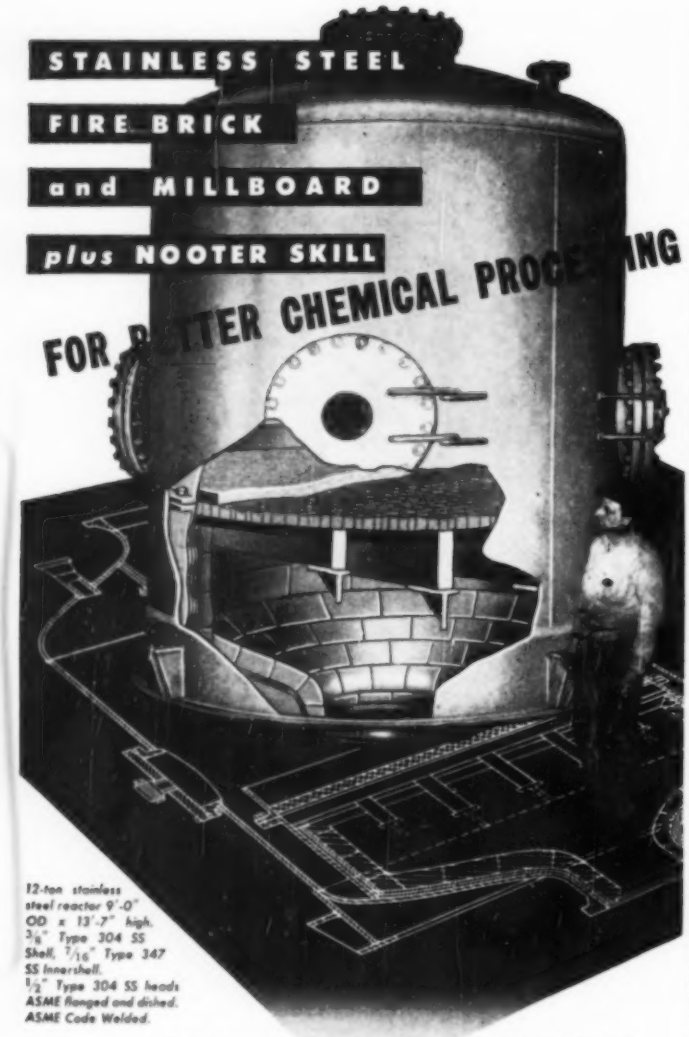
NO CORROSION . . . NO CONTAMINATION . . . NO LEAKS . . . The working parts of the valve are completely isolated from the fluid by the diaphragm. Diaphragm materials, body materials and body linings are available to suit service requirements.

Available in various combinations of valve bodies and operating mechanisms. Write for catalog.

99 YEARS PIPING

GRINNELL

Grinnell Company, Inc., Providence, Rhode Island. Branches: Atlanta • Buffalo • Charlotte • Chicago • Cleveland • Cranston • Fresno • Kansas City • Houston Long Beach • Los Angeles • Milwaukee • Minneapolis • New York • Oakland • Philadelphia • Sacramento • St. Louis • St. Paul • San Francisco • Seattle • Spokane



12-ton stainless steel reactor 9'-0" OD x 13'-7" high. 3/8" Type 304 SS Shell, 7/16" Type 347 SS Innershell. 1/2" Type 304 SS heads ASME flanged and dished. ASME Code Welded.

Faithful reproduction of your blue prints and specifications is, of course, a foregone conclusion in Nooter fabricating, BUT, those vital details — *strength* and *purity* of welds . . . relieving of stresses . . . control of metal properties . . . precision machining . . . flawless fit-up — are perfected even beyond the most rigid code specifications.

To be SURE — be *sure* to submit your blue prints to NOOTER when they're ready for estimating.

Need a NOOTER Catalog? Complete with Corrosion Data Tables — sent for the asking . . . Write!

NOOTER

JOHN NOOTER BOILER WORKS CO. • 1422 S. Second St., St. Louis 4, Mo.

able, the working group will recommend to the commission, through the advisory committee, those portions of material most useful to American industry and technology. The commission will exercise the final responsibility for declassifying the recommended material. Such information will then be published in engineering and industrial journals in the field of metallurgy.

The trial program is in response to the three-part recommendations of the commission's Industrial Advisory Group that: (1) already published material should be organized and clarified, and reports issued in a form useful to industry; (2) unpublished information of non-restricted nature should be made available to industry in useful form; and (3) information still classified, but properly declassifiable and of special interest to industry, should be surveyed and declassified.

Much of the present program of the commission's Public and Technical Information Service is concerned with the dissemination of non-restricted or declassified information. In the past, more demand for declassification of atomic energy information has come from scientific rather than engineering groups. Out of the total of 2,400 papers declassified up to January 1, 1949, the commission reports that only 133 or 5 percent are in the field of industrial technology. The trial program is expected greatly to increase the amount of technological information to be considered for declassification.

Du Pont to Consolidate Ammonia and Plastics

Consolidation of the Plastics and Ammonia Departments of E. I. Du Pont de Nemours & Co., Inc., becomes effective October 1.

Activities of the two departments have become more and more interrelated and interdependent. For example, a number of important products of the Plastics Department are manufactured wholly or in part by the Ammonia Department. Hence the decision to combine the two departments. Du Pont's interest in both the plastics and ammonia fields has been increasing rapidly in recent years and is expected to continue growing.

This change conforms to the Du Pont policy of having manufacture and sale of related products conducted under common management. All products made by both departments will be continued.

Dr. Emil D. Ries, now general man-

(Continued)

All-Metal GYRATORY SIFTER

HAS WIDE CHEMICAL INDUSTRY APPLICATION

NEW AND DIFFERENT is this A-C gyratory sifter for the chemical industry. It's designed after the Low-Head *standard* gyratory sifter — used by food and chemical processors all over the country. But *this* sifter is new and different because it is made entirely of *metal!*

Numerous materials — ranging from pure chemical products (such as barium nitrate) to impure metallurgical products (such as zinc concentrate) — can be efficiently handled by this sifter. *High-temperature* materials can be sifted since this machine has *no* wooden parts. And cleaning is a simple matter. The entire sifter can be easily and safely *washed*.

The Low-Head all-metal gyratory sifter is a compact, high-speed, high-capacity unit holding four to seven sieves. Made of steel and magnesium, it is a strong, lightweight machine. Sieve screens can be silk or metal, with a variety of fine, medium and coarse meshes to choose from.

This new all-metal gyratory sifter is available *now*. Send handy coupon for full details.

Low-Head is an Allis-Chalmers trademark.

ALLIS-CHALMERS

Chemical Milling and Processing Equipment

ALLIS-CHALMERS, 1147A SO. 70 ST A 2620
MILWAUKEE, WIS.

☐ Please send handy packet with information on new All-Metal sifter and standard sifter bulletin 06B6124A.

☐ Would like personal visit from A-C representative with details of new sifter.

Name

Company

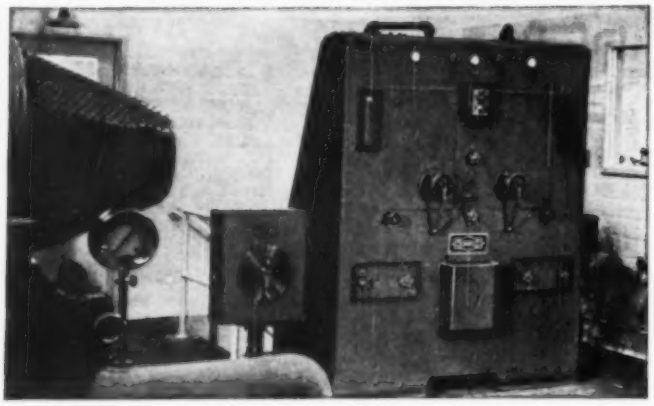
Street

City State

A report on the use of Dorrco D-I water in pharmaceutical manufacture.

at

ORTHO PHARMACEUTICAL CORPORATION



d-i water

✓ IMPROVES PRODUCTS
✓ REDUCES COSTS
✓ SIMPLIFIES CONTROL

The Dorrco D-I System shown above was installed three years ago for the production of demineralized water for pharmaceutical manufacture. Total operating expense has averaged *42 cents per 1,000 gallons of de-ionized water* produced. No resin replacements have been required... and the unit has performed *exactly* as specified when sold.

At Ortho, D-I water has reduced costs when substituted for distilled water... has improved product quality and simplified control by eliminating the variable of fluctuating quality in water supply.

This is but one case where D-I water is paying off on many counts. Regardless of industry, if your process requires water free of dissolved solids, the Dorrco D-I System will produce it ... in any amount ... at a fraction of the cost of distillation.

Write for Bulletin 14081 for complete details.

THE DORR COMPANY
ENGINEERS
Ion-Exchange Division
NEW YORK 22, N.Y. . . . . 570 LEXINGTON AVENUE
CHICAGO 1, ILL. . . . . 221 NO. LaSALLE STREET
DENVER 2, COLO. . . . . COOPER BUILDING

News, *cont.* . .

ager of the Ammonia Department, will head up the new consolidated department. Its headquarters will remain in Wilmington, Del.

Arnold E. Pitcher, general manager of the Plastics Department, who has been slated to retire, will remain until the consolidation is effected.

The Plastics Department has plants at Arlington, N. J., Parkersburg, W. Va., and Leominster, Mass. The Ammonia Department operates plants at Belle, W. Va., and Orange, Tex. It is also building a new one at Victoria, Tex.

Victor Chemical Works Acquires A. R. Maas

Victor Chemical Works, Chicago, Ill., has acquired the A. R. Maas Chemical Co., South Gate, Calif. No change in personnel is contemplated and the present management will continue.

Founded in 1919 by the late Prof. Arthur R. Maas, the A. R. Maas Chemical Co. is a successful and growing manufacturer of photographic chemicals, phosphoric acid and sodium phosphates.

In acquiring Maas Chemical, the Victor Chemical Works increases its producing points to six. Victor operates phosphorus furnaces at Mt. Pleasant, Tenn., and Victor, Fla. Its processing plants are strategically located at Chicago Heights, Ill.; Nashville, Tenn.; Morrisville, Pa.; and South Gate, Calif.

Shell Adds New Wax Unit To Its Houston Refinery

Shell Oil Co. has just completed and put into operation a new, highly instrumented plant designed to produce 75 million pounds of paraffin and micro-crystalline waxes a year at the company's Houston refinery.

Charging stock for the new plant is crude wax from lubricating oils produced in the adjacent lubricating oil plant. Processing of the charging stock into finished waxes involves two basic steps, solvent refining and purification. In the first, the crude wax is subjected to successive treatments with a chemical solvent that separates the last traces of oil from the wax. In the second step, the wax is passed down through several processes that improve and stabilize color and odor.

Intended for all commercial uses, such as treating paper, packaging, making candles, cosmetics and waterproof materials, the wax will be of standard

(Continued)

if you use phenolics....

cut resin costs 15-20%

"Vinsol" Resin Emulsions and Solutions

One of the lowest priced, most plentiful dark resins obtainable today, "Vinsol" is saving money for many manufacturers—as a modifier, extender, or partial replacement for phenolics. A 15-20% reduction in total resin costs is common—with no appreciable sacrifice in physical or chemical properties. "Vinsol" is available as a solid resin and in emulsion or solution form for use with water-soluble or spirit-soluble phenolics. We welcome the opportunity to work with you on possible applications. Write for technical details, samples, prices.

HERCULES POWDER COMPANY 952 Market Street, Wilmington 99, Delaware

"VINSOL" IS REG. U. S. PAT. OFF.

609-4

A versatile valve for general service

STEAM • HOT WATER • COLD WATER
AIR AND GAS • GASOLINE • OIL • BUTANE • PROPANE

Fig. 123 is an exceptionally rugged valve . . . available with various types of discs especially compounded to give top results on the services for which they are recommended. Discs can be renewed or interchanged quick as a wink, insuring long-time satisfactory valve service with negligible maintenance expense. Disc holder is slip-on type, perfectly guided. Hexagon head gland is an aid to easy repacking. A further economy feature is the distinctive long-wearing stem material developed by Lunkenheimer, eliminating stem-thread failure due to wear.

The "N.M.D." valve is also regularly available in angle, check and quick operating patterns. Circular No. 558, descriptive of the complete line, is yours for the asking.

ESTABLISHED 1862
THE LUNKENHEIMER CO.
"QUALITY"
CINCINNATI 14, OHIO, U. S. A.

N. M. D. and other Lunkenheimer Valves are available in all industrial centers. You can depend upon your Lunkenheimer Distributor for prompt service on your requirements.

grades and will be marketed by Shell as well as by jobbers wherever Shell markets other petroleum products.

Mississippi To Stiffen License Requirements

A bill calling for the revision of the present engineering license law in Mississippi will be introduced in the state legislature next January. The measure has the endorsement of the Mississippi Society of Professional Engineers.

Three years of experience, instead of the present one year, will be required of an engineer seeking his professional license, if the measure becomes law. This will bring Mississippi's law into line with the licensing laws of other states, thus improving reciprocal relations.

The bill also defines engineering and creates a specific exemption for stationary engineers.

Autothermic Cracking Is Developed by Universal

A new process, likely to prove valuable both to gas companies and to the petrochemical industry, developed by Universal Oil Products Co.

For gas companies, the new process, which has been named Autothermic Cracking, will reform propane or other volatile hydrocarbons in admixture with air to make supplementary gas to meet emergency peak load demands for home heating on exceptionally severe winter days. For petrochemical manufacturers it will crack ethane converting it to ethylene.

R. M. Deanesly, a Universal research chemical engineer, started with the basic idea of conducting cracking reactions by admixing air with the charge stock rather than by external heating. He has developed techniques resulting in a compact, low cost gasification process of exceptional simplicity. Dilution with nitrogen is reduced to a minimum. This improves the quality of the gas.

The mechanism of the process consists of preheating separately the air and hydrocarbon streams, mixing while hot, and reacting in a small insulated vessel. The hydrocarbon-air mixture is rapidly converted to reformed gas and nitrogen. The hot gases leaving the reactor are cooled by heat exchange. Heat losses are almost negligible. Over-all thermal efficiency of the process is better than 98 percent.

Essentially, the same procedure can be applied to the production of

(Continued)

AS GOOD AS ITS SEAMS

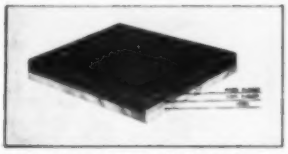
The first sign of "old age" in corrosion-protected equipment is apt to show up at its seams and corners—and that's exactly why Ace engineers are so careful about these details in any Ace hard rubber lined equipment.

For instance, they always check the design of the equipment to minimize the number of seams, and often suggest other simple changes to make the job last longer and cost less.

Ace seams are extra wide, carefully laid out. They're cemented doubly well and rolled down carefully to eliminate any small air pockets. All fillets are built up with rubber, and all edges are ground smooth and round so there will be no stressed corners or blisters in the finished lining.

The Ace bond between steel and rubber is important, too, as shown at left. Result after vulcanizing is a smooth, unbroken surface impervious to almost every agent—a tough surface that stands a lot of abuse.

For corrosion-resistant equipment that won't "give out at the seams" or anywhere else, specify Ace hard rubber linings. Ace solid hard rubber and other important plastics are also available for a wide range of corrosion-resistant applications.



Ace two-layer process: Hard rubber outer layer for best resistance to chemicals and ageing; live, soft-rubber inner layer to provide resilience and strong bond. Where required, Ace linings can be made all hard rubber or all soft rubber, natural or synthetic.

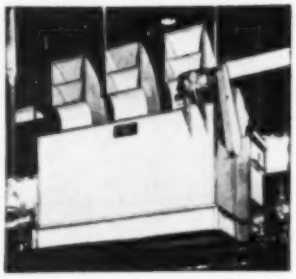
ACE SINCE 1851

AMERICAN HARD RUBBER COMPANY · 11 MERCER STREET · NEW YORK 13, N. Y.

New HIGH PRESSURE STEAM Fan Heater

Gives Savings You Never Had Before

The first heater to make High Pressure Steam really trouble-free and practical in plant heating. Every engineer should understand its original method; write for Niagara Bulletin and performance data.



HOW IT OPERATES: — A dual coil system makes use of all heat, both sensible and latent. High pressure steam enters the upper coil, shown on the diagram below. Its condensate drains into a trap. Then this high pressure condensate is released into the header of the lower coil. It instantly flashes into steam at vapor pressure.

Any high pressure condensate that remains liquid is carried to the vapor condensate return header by a drain tube that also gives off its heat into the air stream.

The vapor condenses in the lower coil. Its condensate is kept at a high level in the return leg by a wier in the return header so that all its heat is made useful and it is sub-cooled by contact with the coldest air entering the heater. Vacuum condensate return to boiler is vapor free.

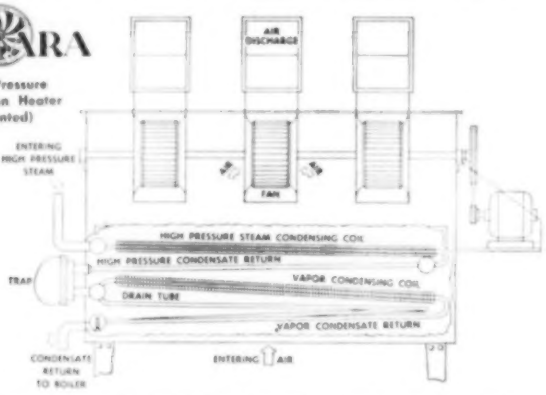
HOW IT SAVES IN COST: — Piping is much simpler and less costly than in low pressure systems. Much secondary piping, traps and big valves are not needed. Pipe sizes are smaller.

HOW IT SAVES IN OPERATION: — Waste is prevented. Every BTU goes where you want it. No dump traps or hot wells waste live steam.

HOW IT SAVES IN UPKEEP: — Condensate flow is even, vapor free, easily handled. No sudden surges of condensate in starting. No hammering, no hard wear and tear on system. Properly engineered for the job, final air temperatures are not excessive; heat easily directed where needed; no flashing of low pressure condensate. Heaters are self-draining on shut-down. Heaters are strongly built; all coils including the condensate drain tubes are hairpin bend, stress relieving. Use thru four heating seasons has proven these advantages in large scale plant heating.

NIAGARA

High Pressure Steam Fan Heater (Patented)



NIAGARA BLOWER COMPANY

Dept. CM, 405 LEXINGTON AVE., NEW YORK 17, N. Y.

Please send Bulletin 109 on the Niagara High Pressure Steam Fan Heater.

Name

Address

NEWS, *cont. . .*

ethylene as has been described for gas making. The preferred raw material for either operation depends on the location of the plant, and other factors.

The Autothermic process has been tested and proved in pilot plant operations producing 1,000-2,000 cu. ft. of gas per hr., and thorough burner tests on the gas have been conducted by engineers of large gas companies.

Propane-air plants now being used by gas companies to produce peak load gas can be readily converted to the Autothermic process.

Gulf States Paper Expands At Tuscaloosa

An expansion program has increased production of kraft paper from 200 to more than 350 tons daily at Tuscaloosa, Gulf States Paper Corp.'s new unit was built by the H. K. Ferguson Co.

The increase in the production equipment was undertaken to meet a growing demand for bags, counter rolls and wrapping paper experienced during the war and continuing into the postwar period. Facilities were also added for the manufacture of high quality white and light-colored papers.

The expansion included the installation of a new high-speed paper machine and construction of a reinforced concrete building to house it, enlargement of the stock preparation and finishing room; an addition to the bag factory, and installation of a hydraulic elevator for more efficient handling of materials.

Other auxiliary facilities were added wherever required by the increase in production. Pulp preparation equipment of larger capacity was installed, another recovery furnace was added, and the bleaching process was revised and lengthened to produce pulp of uniform high white color at a minimum chemical cost.

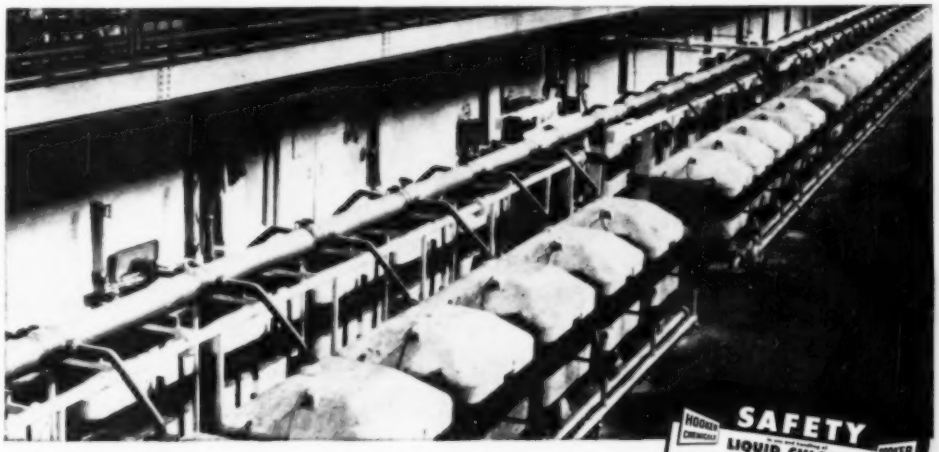
High Frequency Sound May Homogenize Paint

Researchers at Sherwin-Williams Co.'s Chicago laboratories are conducting experiments on the possibility of treating paint with high-frequency sound waves to prevent it from settling in the can. The settling problem has plagued paint manufacturers since 1873, when ready-mixed paint was first introduced. The principle is the same as that used by milk companies to homogenize milk; the problems are greater, however, because the ingredi-

(Continued)

Careful Buyers of Caustic Soda and Chlorine

SPECIFY HOOKER



In the Hooker Electrochemical Company you have a dependable source for caustic soda and chlorine of high quality and constant uniformity. This is testified by the increasing number of users who year after year continue to secure their requirements from Hooker.

They have learned through experience that they can rely on these products of the famous Hooker "S" Cell. Produced under watchful control, each shipment is of the same uniform high quality. Through careful inspection and care of containers it reaches you in the same condition it leaves our plants.

Hooker Caustic Soda is available in solid, flake, or liquid form. Liquid is available in 50%, 73% and special grade solutions.

Hooker Liquid Chlorine, of standard market quality, is shipped in cylinders, multi-unit cars and tank cars.

For uniform processing from uniform Liquid Chlorine and Caustic Soda, specify Hooker.

Users of Chlorine will want a copy of the Hooker Wall Chart, "Recommendations for Safety in the Use and Handling of Chlorine in Cylinders and Ton Containers". Printed in large readable type on linen backed paper, it is ideal for mounting wherever you use or store chlorine.

From the Salt of the Earth

HOOKER ELECTROCHEMICAL COMPANY

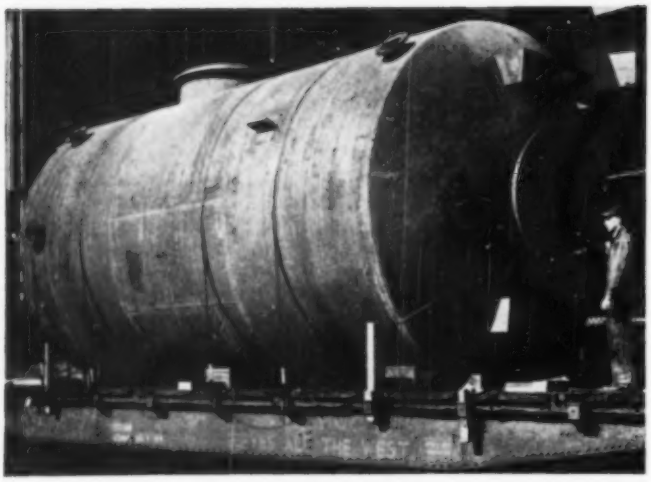
HOOKER CHEMICALS

2 UNION ST., NIAGARA FALLS, N. Y.

NEW YORK, N. Y. • WILMINGTON, CALIF. • TACOMA, WASH.

9-1061

SODIUM SULFIDE • SODIUM SULFHYDRATE • SODIUM TETRASULFIDE • CAUSTIC SODA • MURIATIC ACID • PARADICHLOROBENZENE • CHLORINE



Pyroflex constructed HCl cooling tower.

PYROFLEX CONSTRUCTIONS

Individually "Tailored-To-Fit"

TYPICAL of Knight engineered Pyroflex Constructions is the HCl Cooling Tower above. In designing it, Knight engineers carefully checked over eventual service conditions under which it would operate. As a result this complete functional unit is tailored to fit a specific job — corrosion proof not only against HCl but also all other corrosive conditions that may develop at point of service.

Each Pyroflex Constructed tank, tower, fume washer, absorber, etc., is individually designed to meet the requirements of the situation in which it will be used. In each case Knight engineers incorporate the materials best suited to the individual service conditions. Materials may include ceramics, glass, fused silica, plastics, carbon or any other suitable material. Consequently, Pyroflex Constructed Units offer longer, trouble-free service with less down time and lower maintenance costs.

When inquiring about Pyroflex Constructions, please specify type of equipment in which you are interested as well as service conditions involved.

Maurice A. Knight 109 Kelly Ave., Akron 6, Ohio
Acid and Alkali-proof Chemical Equipment

cents of paint are much harder to mix.

The development, if successful, will not only end the need for stirring paint prior to use, but will also result in cheaper production costs. Inexpensive equipment built on the sound principle may replace the huge rolling mills and stirring vats now used. The paint would also have less variation in surface color, and greater hiding power.

The experimental unit, a 2,000 watt sound generator with a speed of 150,000 rpm. contains 60 small cone-shaped holes in its stationary head which develop sound of 150,000 cycles per second at top speed. This is about ten times the maximum audible frequency.

Paint to be homogenized in experiments has been placed on top of the generator. It may be possible in commercial use to simply pass paint through the field of sound waves.

Briefs . . .

Newport Industries, Inc., is putting up a $500,000 plant at Oakdale, La., to manufacture a specialty rosin. This move will help to stabilize the local industry in the competitive domestic market.

Du Pont expects to have additional facilities for the production of methoxychlor insecticides in operation at the Linden, N. J., plant of its Grasselli Chemical Department late this fall.

Mississippi Chemical Corp. has approved a contract with the Girdler Corp., Louisville, Ky., for construction of a $5 million fertilizer plant at Yazoo City, Miss.

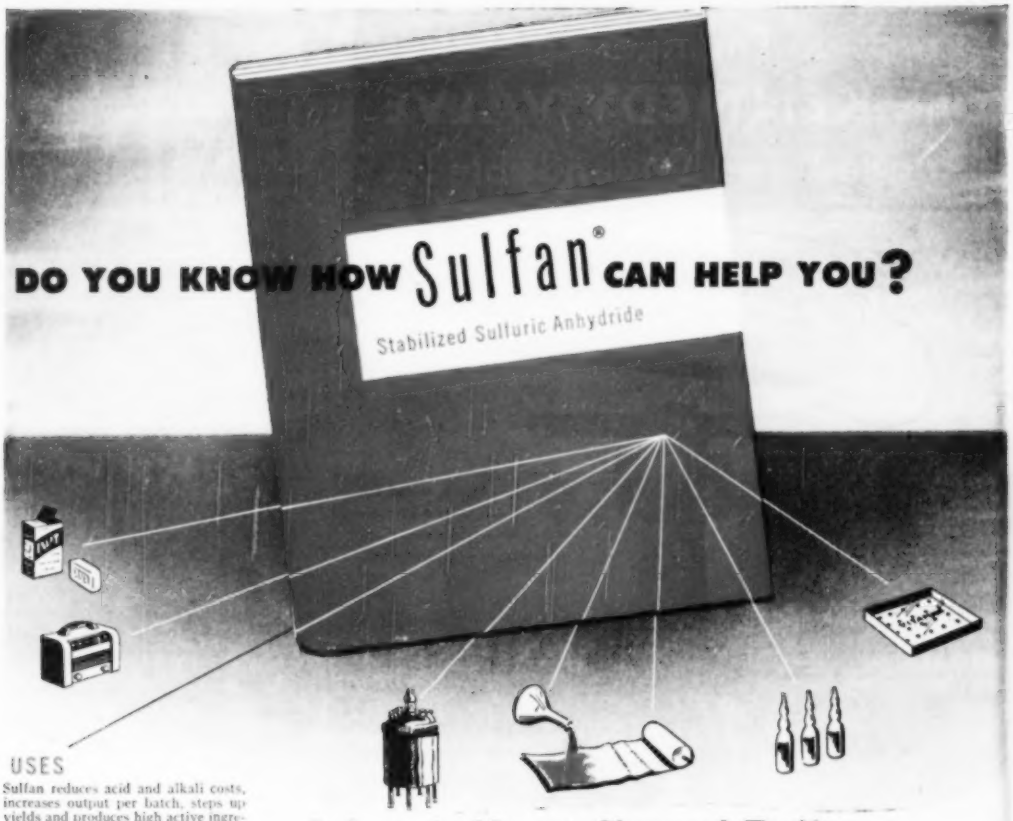
Nitro Co., a new firm at Columbia, Tenn., will engage in the sale, distribution and application of anhydrous ammonia to crop lands in Maury and surrounding counties.

Harshaw Chemical Co. has opened a branch of its Scientific Division in a specially built warehouse at 6622 Supply Row, Houston, Tex. Hereafter, not only scientific apparatus but also industrial chemicals will be distributed from this office.

Nealco-Monsanto Co. is the new name of the New England Alcohol Co., Everett, Mass., jointly owned by Monsanto Chemical Co. and Central Aguirre Sugar Co. of Puerto Rico. Nealco-Monsanto makes fermentation alcohol and carbon dioxide.

Stacey-Dresser Engineering has built another Desulfo unit. This one is for the Hoosier Gas Corp., Vincen

(Continued)



USES

Sulfan reduces acid and alkali costs, increases output per batch, steps up yields and produces high active ingredient content or completely salt free materials in these reactions:

Sulfonation of alkylated aromatics to produce synthetic detergents
Sulfonation of fatty acids to give hydrolysis-resistant wetting agents
Sulfation of alcohols
Mono- and polysulfonation of aryl compounds to produce dyestuff intermediates
Direct sulfonation of aliphatic compounds

Sulfan also demonstrates advantages in the following applications:

Elimination of mixed sulfonates in benzenoidal sulfonations
Adjusting the concentration of high strength oleums
Fortification of spent sulfuric acid and oleum
Formation of addition compounds with amines
Direct production of sulfones

BASIC CHEMICALS
FOR AMERICAN INDUSTRY
50 YEARS OF SERVICE

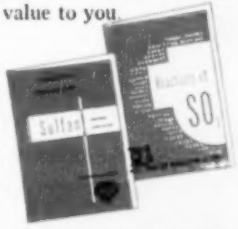
Industry's Newest Chemical Tool!

With General Chemical "Sulfan," industry has *workable* Sulfuric Anhydride at its command for the first time in chemical history . . . SO_3 in stabilized liquid form! "Sulfan" makes realities of the many promising uses Sulfuric Anhydride has long been known to hold.

The economical application of "Sulfan" in the unit process of sulfonation is already established; other uses are fast becoming commercial realities. To put this new chemical to work in your operations, draw upon the special application data General Chemical Research has developed for various processes. An outline of your particular requirements will enable us to compile material of greatest immediate value to you.

HELPFUL TECHNICAL BULLETINS

General Chemical Technical Service Bulletin SF-1 (SULFAN) and Technical Service Bulletin SF-2 (Reactions of SO_3) provide extensive data on the physical and chemical properties of "Sulfan," together with a summary of more than 400 references found in the chemical literature concerning the reactions of sulfuric anhydride. You will find these excellent source material for fundamental research and product development, as well as production.



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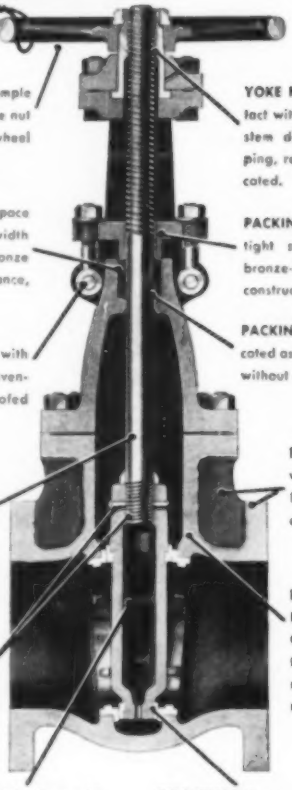
Precision Engineering Makes this KENNEDY VALVE Rugged and Dependable...

KENNEDY STANDARD IRON BODY WEDGE GATE VALVE
Fig. 0611, outside-screw-and-yoke. Service up to 125 lb. p.s.i. steam; 200 lb. p.s.i. water, oil or gas. 1 ⅓" through 48" sizes available.



HANDWHEEL, large, for ample leverage . . . secured to yoke nut by large bronze, hexagonal wheel nut, readily removable.

STUFFING BOX, packing space depth is more than 4 times width for longer packing life. Bronze bushed for corrosion resistance, durability.

BOLTS, swing eye type with washer nuts, for greater convenience in repacking. Rust-proofed to prevent corrosion.

STEM, rolled bronze, liberal diameter, for high tensile and torsional strength. Top seat collar permits repacking under pressure.

STEM AND DISC threaded together, prevented from turning by nickel copper alloy pin with ends riveted over.

WEDGE DISC, reversible and interchangeable, reinforced by integrally cast interior posts. Openings permit drainage in any position.

YOKE NUT, bronze, thread contact with stem at least 1½ times stem diameter eliminates stripping, reduces wear, easily lubricated.

PACKING GLAND machined for tight seal with stuffing box, bronze-bushed at stem. Slotted construction simplifies repacking.

PACKING, molded rings of lubricated asbestos maintain tightness without excessive gland pressure.

FLANGES are heavy and well filleted. Flanged ends have reinforcing ribs for extra strength.

BODY AND BONNET, Kennedy Higher Strength Cast Iron, generous metal thicknesses and well rounded corners provide maximum strength.

DISC RINGS, bronze, wide and thick, forced into dove-tailed grooves in disc to form practically integral construction.

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nes, Ind. To be operating this month, it will process up to 3,000,000 cu. ft. of gas a day, reducing the hydrogen sulphide content of the gas to 1 grain per 100 cu. ft.

Socony-Vacuum Oil Co., Inc., New York, will construct four thermofor catalytic cracking units—one in Trenton, Mich.; one in Augusta, Kan.; and two in Beaumont, Tex.

ADDENDUM

The filter referred to in line 18, col. 3, pg. 92, of the July issue was built by the Niagara Filter Corp.

READERS' VIEWS AND COMMENTS

Gallons Per Day

To the Editor:

Sir:—I wish to congratulate you on your report, "The Water Problem," published in the July issue of *Chemical Engineering*. Your presentation of factual and statistical data has been achieved in an interesting and readable manner.

Because your article will undoubtedly be used as a valuable reference by others interested in water studies, I should like to point out one error in the report concerning the Celanese water supply. On p. 122 the second paragraph includes the statement ". . . taking less than 390,000 gpm. from only three of its 10 wells at Bishop for sanitary water and boiler feed make-up." The correct figure for well water withdrawals at our plant is 390,000 gpd.: gallons per day, not gallons per minute.

I thought this information would be of interest to you in case you care to make the correction in your reprint articles or in some future issue of *Chemical Engineering*.

—HOMER C. WILSON, JR.
Celanese Corp. of America
Bishop, Tex.

Humanistic Symbolism

To the Editor:

Sir:—The time has come to clear the engineering atmosphere of that weak excuse, "I just can't see it." Jed, the algebraic operator of humanistic symbolism puts the mechanics of any problem before your very eyes. The time has come to abandon Euclidean geometry and the algebra of the decadent past for Humanistic Symbolism—the system that eliminates thinking, yes, thinking!

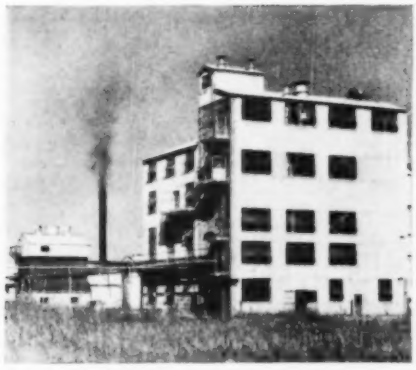
We present Jed. Jed, the physically

(*Continued*)

New Oil Extraction Record of 99.41% set by Tennessee Mill!

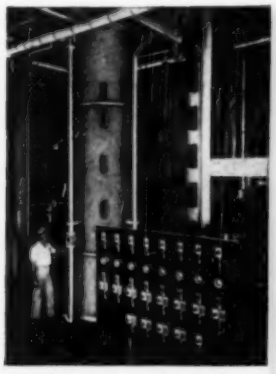
Peter Fredrickson

"IT'S AN ALL-TIME HIGH for us," states Mr. Peter Fredrickson, manager of the West Tennessee Soya Mill, Inc., Tiptonville, Tennessee. "Our old plant had a screw press system. Our new mill uses the Allis-Chalmers continuous system of solvent extraction which is a tremendous improvement. Recent figures show that residual oil in the extracted meal is down to a record low of .59%. We are actually extracting 99.41% of the oil from the soybeans processed in our mill."



PROCESSING of soybeans at the new West Tennessee Soya Mill plant started just one year ago. Rated at 150 ton capacity, it is actually handling 190 tons as a daily average. Percentage of oil extracted is extremely high, solvent loss is only 2.03 gallons per ton and maintenance has been far less than for the previously used screw press system.

PREPARATION building contains these Allis-Chalmers 32" x 40" flaking mills plus A-C sifters, roller mills, heaters, coolers, motors, Texrope V-belt drives. Entire plant is coordinated by A-C for greatest efficiency.



EXTRACTION column is heart of the entire oil extraction process. Note handy control panels for easy, accurate regulation of production. Savings in labor is another advantage of this semi-automatic Allis-Chalmers system.

ONE OF MANY MILLS EQUIPPED BY ALLIS-CHALMERS

IT'S NO WONDER that West Tennessee Soya Mill, Inc. is well satisfied with the Allis-Chalmers system of continuous solvent extraction. Production stepped up — oil yield increased — labor cost and maintenance reduced . . . these are definite advantages adding up to new opportunities for greater operating profit.

Many *similar* plants for the continuous solvent extraction of cottonseed, soybean, corn germ, rice bran and other vegetable oils have been engineered and equipped by Allis-Chalmers. Maybe A-C can help you, too, get greater dividends from your mill. Send coupon at right for full information.

Texrope is an Allis-Chalmers trademark.

ALLIS-CHALMERS

Pioneers in the Field of Continuous Solvent Extraction

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☐ Please send solvent extraction bulletin 13B6757A.

☐ Am interested in information on solvent extraction of.....

☐ Please send A-C representative.

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THE *Versatile* VERSENES*...

. . . can make your products (and processes) better!

VERSENE Fe-3* . . .

The powerful new sequestrant — does more than soften water without precipitation. It actually inactivates troublesome trivalent iron as well as calcium, magnesium and other metallic salts. Until VERSENE Fe-3 was developed, there was no really satisfactory sequestering or chelating agent for ferric iron. At pH7 10 cc of Versene Fe-3 sequesters at least 167 mg. of Fe_2 plus 158 mg. of calcium. Above pH9 it is most effective on alkaline earth ions.

VERSENE* (REGULAR)

Is the tetra sodium salt of Ethylene diamine tetra acetic acid and is available in solution or powdered form. Extremely versatile, economical and efficient, it may be used to do a variety of things such as:

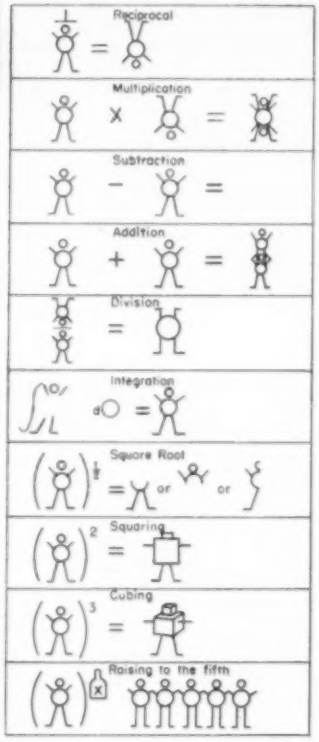
- •Softening Water Without Precipitation
- •Removing Hard Water Deposits And Precipitates
- •Dissolving Grease And Food Deposits
- •Clarifying Liquid Soap Solutions
- •Preventing Oxidation Of Fats, Oils, Soaps, Fatty Acids, Organic Materials
- •Stopping Reactions Catalyzed By Metallic Ions
- •Aiding In Purification Of Materials
- •Separating Metals From Each Other
- •Reducing Activity Of Metal Ions

VERSENE* is a pale, clear, straw-colored aqueous solution with *total solids* approximating 34%. It has an approximate *density* of 1.2 and an approximate pH of 11.75 in a 1% solution. VERSENE* is also available in crystalline form as a dry white powder. Send for Technical Bulletin No. 1. Ask for Fe_2 Data Sheet. Samples on request.

*Trade Mark

BERSWORTH CHEMICAL COMPANY
Framingham, Massachusetts

simple and asexual driving force of our new system. Jed shows you the basic operations:



Jed has been given grudgingly to the world by

B. J. SCHIEFMAN

Note: Chemical Engineer Schiffman sent the above chuckle material to our Plant Notebook Editor under the justification of novel methods of presenting data. He says that his list is but a smattering of Jed's infinite possibilities and that he will welcome further contributions.—Editor.

Tetrachloroethane

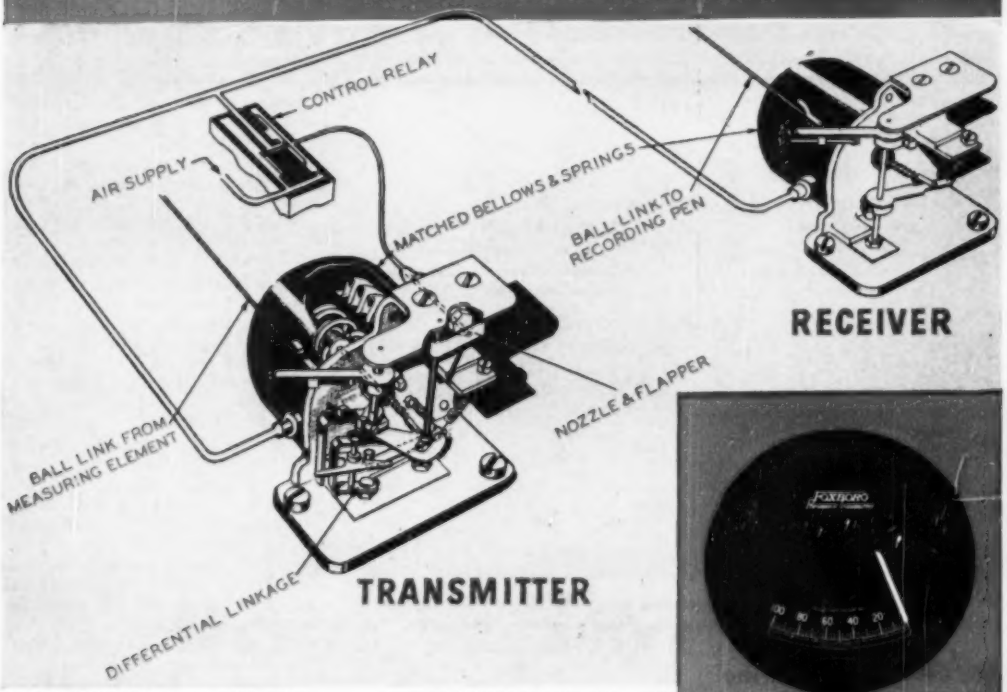
To the Editor:

Sir:—My experience includes the manufacture of acetylene-chlorine products from the beginning. May I add some remarks to Dr. Skeen's article which appeared in the July edition (p. 315) of your journal.

Bosnische Elektrizitaets A.G., Vienna, Austria, operated in Jajce, Bosnia (at that time part of Austria-Hungary), a calcium carbide plant and a mercury cell chlorine plant. Carbide dust from the crusher was a

(Continued)

NEW, ADVANCED DESIGN IN PNEUMATIC TRANSMISSION!



FEATURING *linear calibration,* the new Foxboro Model 42 Pneumatic Transmission System introduces a new standard of accuracy in long distance measurement of process variables. Transmitter and receiver elements are made to a master calibration standard, assuring precise readings at one or more distant points, with perfect interchangeability of units.

This new transmission system also features a newly designed reference (zero) arrangement which permits adjustment of the indicating pointer without affecting transmitter calibration . . . large, easy-to-read scales . . . standard Model 40 air relay and exclusive ball linkage.

Transmitters are furnished in a standard 12" indicating case, illustrated at the right. Receivers are supplied in indicating or recording models, or the receiver unit may be used as the primary element in any Foxboro air-operated or electric-operated Controller.

The new Foxboro Transmission System is available for flow, pressure, temperature, liquid level, humidity, etc. For complete details, write **The Foxboro Company, 74 Neponset Avenue, Foxboro, Mass., U.S.A.**

FOXBORO REG. U. S. PAT. OFF. **PNEUMATIC TRANSMISSION**

You know that - -

HIGH VACUUM PUMPS REQUIRE CLEAN OIL!
free from abrasive solids, varnish forming substances, and especially volatile contaminants which raise vapor pressure and decrease processing efficiency.

. . but do you know

that oil can be purified easily by complete removal of all contaminants on a continuous, full-flow basis after each pass through a vacuum pump, resulting in continuous pump operation at maximum efficiency, and in elimination of oil waste?

Ask . .

these manufacturers of refrigeration compressors—

Carrier Corporation	York Corporation
Seeger Refrigerator Company	Universal Cooler Division
Liberty Motors Corporation	Tecumseh Products Company
Jack & Heintz Precision Ind.	Norge Division

. . or these manufacturers of chemicals and pharmaceuticals—

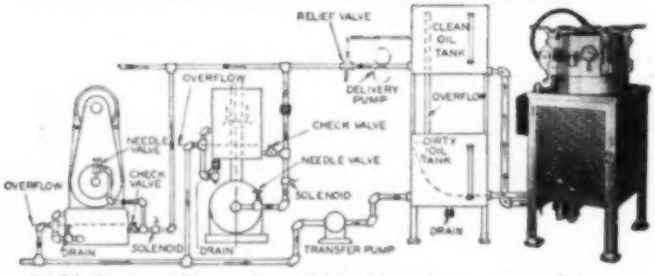
E. R. Squibb & Sons	Merck & Co., Inc.
Chas. Pfizer & Co., Inc.	Winthrop Chemical Co., Inc.
Bristol Laboratories, Inc.	Commercial Solvent Corp.
Carbide & Carbon Chemicals Corp.	Lederle Laboratories Div.
Distillation Products Co.	The Upjohn Co.
J. T. Baker Chemical Co.	Sharp & Dohme

or these manufacturers of condensers, capacitors, transformers, electron tubes, and other electrical equipment—

Aerovox Corporation	Picker X-Ray Corp.
General Electric Co.	Sprague Electric Co.
Line Material Co.	Stromberg-Carlson Co

. . or manufacturers of optically coated lenses, metallized paper, cyclotrons . . . in short any manufacturer using high vacuum rotary pumps.

Ask them about the HILCO OIL RECLAIMER



HILCO Continuous Vacuum Pump Oil Purifying System. Oil purified at a fraction of a cent per gallon.

Write for Bulletin R-160

better still ask us . .

THE HILLIARD CORPORATION

207 West Fourth St., Elmira, New York

READERS' VIEWS, cont. . .

very unwelcome product and so was chlorine. To use both for a marketable product was an attractive suggestion.

Consortium fuer Elektrochemische Industrie was the research organization of Bosnische and the acetylene-chlorine problem was tackled at least ten years before Dr. Alexander Wacker Ges. started operation. In 1908 Bosnische, Jajce, started a pilot plant and in 1909 the commercial manufacture of acetylene-chlorine products began. In the same year Castner-Kellner Alkali Co., Runcorn, England, took over the Consortium-Bosnische process. The chlorine came from their electrolysis, the carbide originated from Hafslund, Norway, also operated by Bosnische.

In 1913 Cie Gle d'Electrochimie de Bozel, France, started acetylene-chlorine products manufacture in Villard du Planay (Savoie). This was connected with the carbide plant there as well as the electrolysis of fused NaCl, installed in 1913. At that time there was only one small plant in Aschersleben, Germany, and Bosnische supplied chlorinated solvents for Germany, Russia, U. S. A., etc.

The Wacker acetylene-chlorine products plant was, like the carbide plant etc., designed by Bosnische and Wacker's technical staff came from Bosnische. Wacker probably did not start before 1920. Wacker, which was under the same ownership as Bosnische, was separated in 1918. Bosnische entered the Dynamit Nobel Combine and later I. G. Farben.

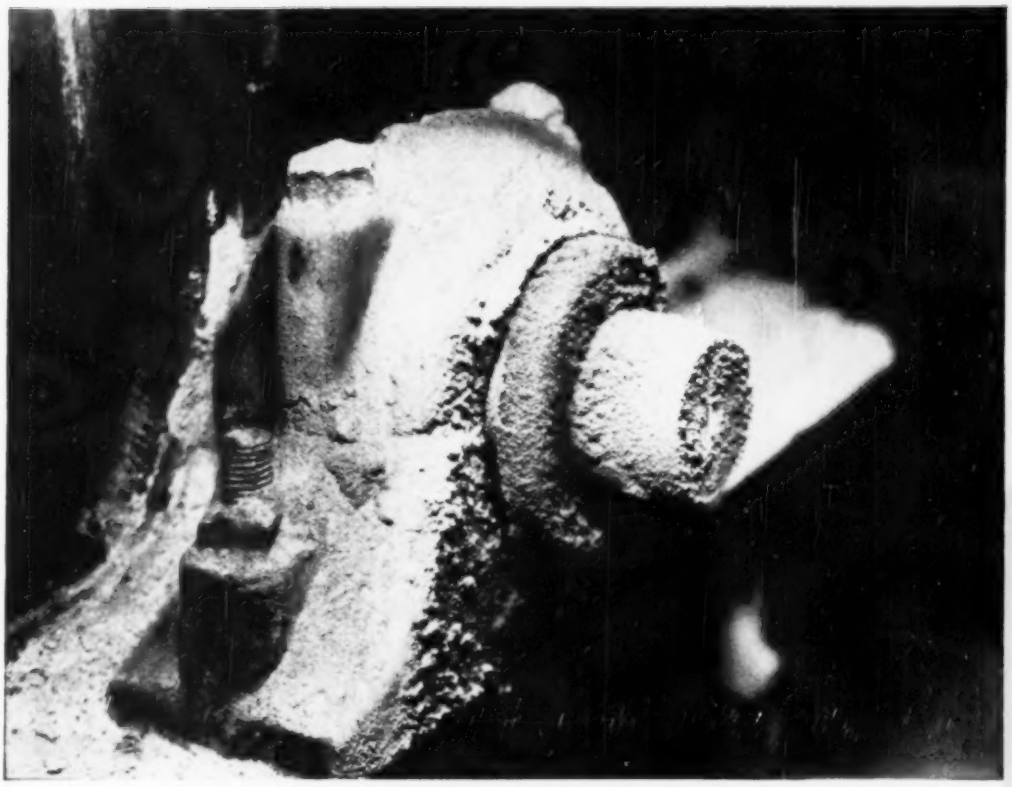
MAX SPITZER
Electrochemical Construction Co.
New York, N. Y.

Note: Max Spitzer, chemist and founder of the Electrochemical Construction Co., died in New York August 7 at the age of 66.

Dr. Spitzer was born in Mikulov, Czechoslovakia, then part of Austria-Hungary. He received his doctor of philosophy degree in chemistry from the University of Vienna. He worked as general technical director for concerns producing heavy chemicals and for their subsidiaries in Central Europe, Norway and France until 1938. A specialist in electrochemistry, electrothermics and their products, he later worked in France and Argentina in the field of caustic soda and chlorine.

In 1941 Dr. Spitzer came to the United States and founded Electrochemical Construction, specializing in the designing and construction of chemical plants here and abroad.

—Editor.



DEFIES ABRASIVE DUSTS!

The Famous Dodge-Timken Type C Bearings in Your Plant Assure <u>Uninterrupted</u> Production

POSITIVE TRIPLE SEAL —ANOTHER DODGE "FIRST"

WHEN you grind steel, cement, iron or rock you get dust — powdery, abrasive dust that seeps everywhere—except into Dodge-Timken Type C bearings like the one pictured above, which keeps the mill on which it is installed running smoothly at 3000 r.p.m.!

Wherever you have operating conditions of extreme dust and dirt, standardization on the Type C is your answer. Triple steel seals keep the lubricant in and the dirt out of this bearing, and in thousands of installations Dodge-Timken Type C pillow blocks are operating successfully under adverse conditions where other bearings failed. Rugged in construction, fully self-aligning, with both radial and thrust, carrying capacity, Type C is suitable for heavy line shaft service as well as many machine applications.

For complete information concerning this bearing and other Dodge "Firsts" in power drive equipment call a Transmissioneer—your local Dodge Distributor. Look for his name under "Power Transmission Equipment" in your classified telephone directory.

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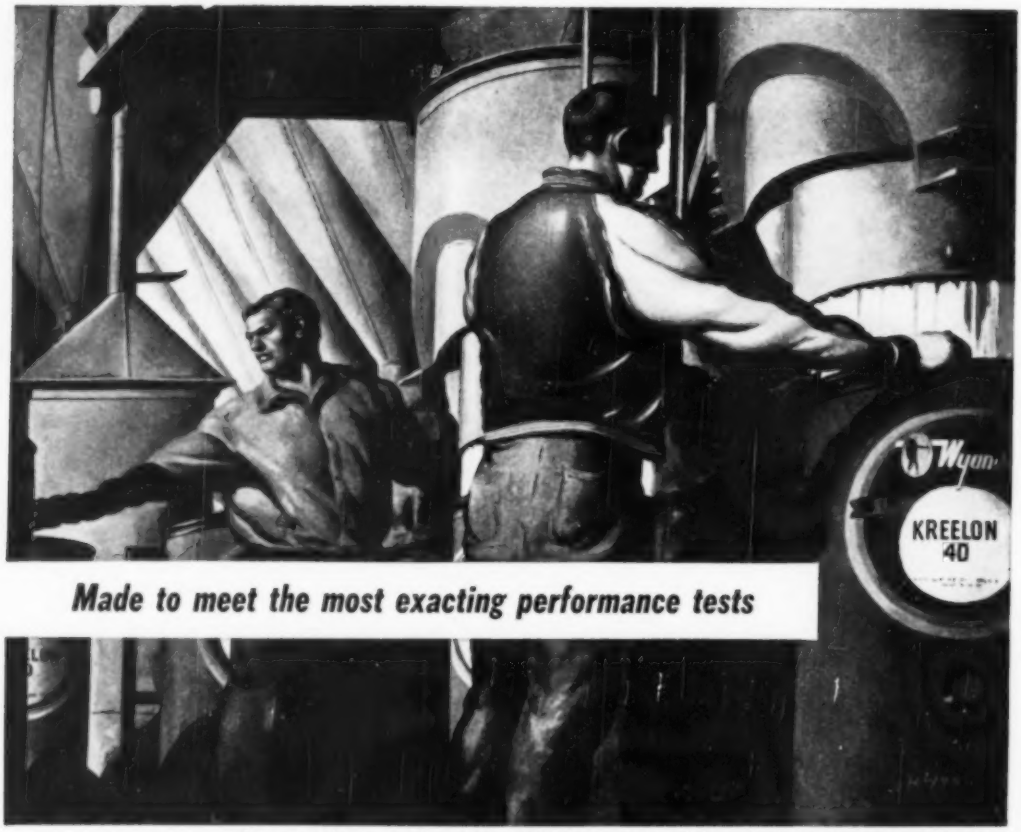
The Transmissioneer is a graduate of an intensive training course at the Dodge factory. He can help you find the answer in applying power to the job.

FOR YOUR NAME PLATE REQUIREMENTS, WRITE OUR SUBSIDIARY, ETCHING COMPANY OF AMERICA 1520 MONTANA STREET, CHICAGO 14, ILLINOIS



Made to meet the most exacting performance tests

Here you see the conveyor line and the great, looming storage bins of the new Synthetic Detergent Plant at Wyandotte

WYANDOTTE KREELON—*the white, uniform detergent and wetting agent*

If you produce cleaning compounds or other products that call for an effective synthetic organic detergent, you'll find the answer in *Wyandotte Kreelon*®. Or if some operation in your plant requires an unusual amount of time and labor in the wetting-out process, chances are that Kreelon can help you do a *better job, faster.*

This versatile chemical, broadly classified as a surface-active agent, is designed to meet rigid performance specifications. Initial production of Kreelon was delayed for months until the product's color, chemical analysis and performance measured up to the highest standards. Controlled production maintains these standards.

The three grades of Kreelon produced range from *white* to *light cream* in color and have only a faint characteristic odor. Equally important is the fact that they retain their wetting, sudsing and cleansing properties in acid, alkaline or neutral solutions — in hard or soft waters.

Wyandotte Kreelon is readily available and economically priced. Complete information on its properties and suggested uses will be furnished at your request. In addition, our experienced technical staff stands ready to assist you in solving many detergency problems.

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CARBOSE (Sodium CMC) • ETHYLENE DICHLORIDE
PROPYLENE DICHLORIDE • CHLOROETHERS
AROMATIC SULFONIC ACID DERIVATIVES
OTHER ORGANIC AND INORGANIC CHEMICALS

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REG. U. S. PAT. OFF.

News From Abroad

SPECIAL CORRESPONDENCE

Mexican Acetate Rayon Output Surges Upward

Mexico City—Compania Celanese Mexicana S. A., associated with the Celanese Corp. of America, turned out more than five and one-half million kilos of cellulose acetate fiber for use in thread-making in the first six months of this year, it has been announced.

This production is part of a program of government encouragement of the rayon industry in Mexico that has resulted in Mexico now resting in fourth place in the world among producers of acetate cellulose fiber.

Celanese Mexicana S. A. opened its first plant in Ocotlan in 1947 and its production since then has exceeded all hopes according to company officials. It claims that Mexican fiber is now sold on the world market at a competitive price with U. S. production.

The company was formed by Mexican capitalists in association with Celanese. The latter provided trained technical help as well as training Mexican technicians.

Big Soda Ash Stocks Worry Indian Producers

Bombay—Opening of an emergency Tariff Board inquiry into the Indian soda ash industry has revealed that combined stocks already on hand with manufacturers and importers are equal to a year's supply. The two main producers, Tata Chemicals Ltd. and Shri Sakti Alkali Works Ltd., have 18,000 metric tons on hand between them while stocks lying with importers are officially estimated at 72,000 metric tons.

Both producers have shut down temporarily, and their total output for 1949 is expected to be only about 20,000 metric tons compared with a record 29,000 metric tons last year. They never have run anywhere near rated capacity, which is 29,000 metric tons for Tata and 18,000 metric tons for Shakti.

The situation is blamed on the previous inclusion of soda ash on the free import list—import from dollar areas is now banned and from soft currency areas strictly restricted. Contributing factor is that both Indian producers make light soda ash, while the largest single user of soda ash is the Indian glass industry which follows world practice in using dense soda ash. It consumes 25 percent of India's soda ash.

The Tariff Board is expected to recommend that the Indian soda ash producers switch to dense ash, and that a substantial protective import duty be levied.

Vacuum Oil Completes New Refinery Near Melbourne

Melbourne—A refinery capable of treating more than 15,000,000 gal. of crude oil annually has been completed by the Vacuum Oil Co. (a Standard Oil subsidiary) at Altona, near Melbourne. Though small by international standards, it is claimed to be the largest Australian refinery. Its output will include 4,000,000 gal. of lubricants, 9,000,000 gal. of fuel oil, 2,000,000 gal. of gasoline and 18,000 tons of bitumen. The plant cost more than $3 million to construct. It is expected to save Australia $1 million annually by producing refined products from cheaper crude.

The crude is brought to Melbourne in 15,200-ton tankers and pumped from the discharge point to the storage tanks at Altona. The refinery has a crude oil storage capacity of 6,000,000 gal., comprising three tanks of 2,000,000 gal.

South Africa Plans Soda Ash Unit

Cape Town—South Africa is planning the construction of a soda ash plant near Douglas in the northern part of Cape Province which is expected to cost $22,000,000. Actual construction will begin soon, though it is not anticipated that the plant will come into production for three or four years. At that time, South Africa will no longer be dependent on the importation of soda ash and should be in a position to export a surplus.

A shortage of brine is responsible for the fact that this plant has not previously been established. Mining interests in Johannesburg recently purchased 3,000 acres on the banks of the Vaal River where the factory will be built. It is expected that employment will be provided for 300 Europeans and 500 native workers who will be housed in a self-contained townsite being planned in the vicinity. The brine will be pumped through 22 miles of pipe from a 500-acre salt lake which produces 50,000 tons of salt a year or one-third of South Africa's total output.

Hydrocarbon Research Will Erect Brazilian Refinery

Rio de Janeiro—Brazil has signed agreements for construction of the first big petroleum refinery in the country, scheduled to be in production in five years.

Pan American Hydrocarbon Research, a Hydrocarbon Research subsidiary, will do the engineering and installation. A French group, Compagnie de Fives-Lille and Schneider & Cie., will provide the material and equipment.

The refinery is slated for 45,000-barrel-a-day production, using imported petroleum, at least until potential Brazilian supplies are developed. The cost is estimated at $60-million.

Location has not yet been announced. The original plan of the government's National Petroleum Council to put it at Belem, at the mouth of the Amazon, apparently has been scrapped. Belem lies roughly 2,500 sea miles from the country's industrial areas of Rio and São Paulo (overland transportation is practically impossible), and this fact apparently outweighed the strategic importance of northern Brazil in case of another World War, as well as Belem's nearness to Venezuela, source of most of Brazil's petroleum supplies.

(Continued)

Is yours a problem of
MIXING?
IF SO, let Sprout-Waldron be the first to come to your assistance.
Everyday we are matching customers' standard and specialized requirements for handling foods, dyes, plastics, chemicals—or what have you?
At Sprout-Waldron you will find a size, a type, and a construction for almost every mixing need.
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FOREIGN NEWS, cont. . .

Signing of the refinery contracts was a further step in Brazil's program to reduce her dependence on foreign refining. Last year the country spent about $300,000 a day in very scarce dollars for petroleum products, of which about $122,000 was for gasoline alone. She believes she can reduce this bill drastically by local refining, and that eventually Brazilian refineries will be supplied by the oil which presumably lies beneath Brazil's own soil.

So far, rather minor efforts to produce oil in Brazil have resulted in bringing in wells only in the Bahia region, where construction of a 5,000-barrel-a-day refinery has begun. Preliminary studies have been made in several other regions.

Contracts for construction of two other refineries have been granted to two Brazilian companies: Refinaria e Exploração do Petroleo União S.A., headed by Alberto Soares Sampaio, to handle 20,000 barrels a day at São Paulo, and Refinaria de Petroleo do Distrito Federal S.A., under Drault Ernani, to produce 10,000 barrels a day at Rio de Janeiro. The authorizations were granted in August, 1947, but there has been little progress. The first company was to get its equipment in Czechoslovakia, using blocked Brazilian credits there; the second was to make its purchases in the United States.

The government's plant, thus, involves government ownership and operation of the largest and smallest refineries, with output scheduled to total 50,000 barrels daily, and private ownership and operation of the two intermediary refineries, with production of 30,000 barrels. But, except for the small Bahia plant, realization of the plan is still several years off.

"Correio da Manhã," important Rio newspaper which has been campaigning for rapid action in building the refineries, has calculated that by the time they are completed their output will fall far short of demand and Brazil still will have to import several million barrels annually. Two major elements in the increased consumption are expanded use of motor transportation, as the country builds new roads, and greater use of fuel oil, as industrialization progresses.

The government's 45,000 barrel refinery, according to General João Carlos Barreto, president of the National Petroleum Council, will occupy about 1,200,000 sq. m. and will work 24 hours a day, with 600 employees. It will require water supply of 200 cu. m. per min. and electric power of 5,000 kw. It will consume

(Continued)

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Bailey bulletin No. 17 shows how you can use this improved control system. Write for your copy and keep it handy for reference the next time you need process controls.

P-19

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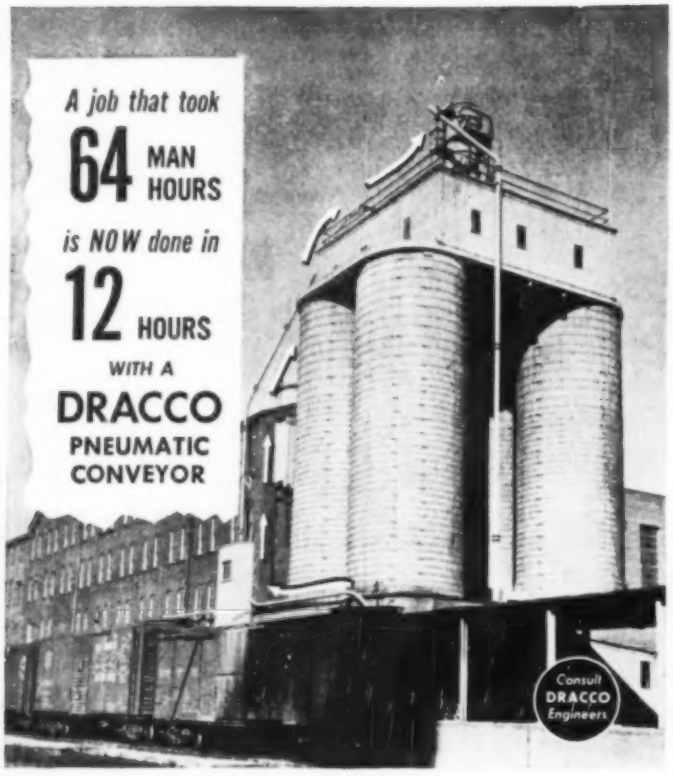
4 + 8 Works Here at the Wyandotte Chemicals Corporation North Plant, Wyandotte, Michigan



DRACCO Pneumatic Conveyors are making large savings in hundreds of plants moving chemicals, grains and granular materials. In the installation illustrated above it formerly took 64 man hours to unload a car. The same job is now done in 12 man hours with a DRACCO Pneumatic Conveyor. In addition to this there is also a 10% saving in material — that was formerly lost in handling. DRACCO Pneumatic Conveyors reduce handling costs to the minimum. Why not consult DRACCO Engineers? They have reduced handling costs for many.

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700 tons of fuel oil daily, as well as 42 tons of sulphuric acid and large quantities of caustic soda, potash and other chemicals.

Engineers' Starting Pay Climbs in Canada

Ottawa—For the past four years there has been a continued upward trend in starting salaries of graduates in science and engineering. This was revealed by Canada's Minister of Labor, Humphrey Mitchell.

The median annual starting salary of these graduates in 1946 was $2,150. This figure had risen each year to reach a peak for the class of 1949 of $2,550, the Minister stated, disclosing that some of the information was obtained from employers and the rest of it was obtained from the students themselves.

Approximately 76 percent of the starting salaries of the 1949 class were $2,400 per year or higher, while the lowest 10 percent had a maximum of $2,260. This compared with 55 percent in 1948 who received $2,400 or higher annually, while the lowest 10 percent last year had a maximum of $2,100.

British Research Develops Colored Road Surfacing

London—Asphalt roads in bright colors may soon be possible. Experiments carried out by the Road Research Laboratory of Britain's department of Scientific and Industrial Research have produced asphalt in colors such as cream, yellow, red, green, and blue at a cost not very much greater than that of ordinary asphalt.

Colored asphalts made from pigmented "albino" bitumens have been used for many years but they are much more costly than ordinary asphalt. Only dark shades could be produced because of the intrinsic darkness of the bitumen.

The new bright colors are made by using a proprietary brand of resinous binder known as "Cados." It is more translucent than albino bitumen and its cost compares favorably with that of ordinary bitumen. Using this binder and a clean white aggregate such as calcined flint, it is possible to obtain a fine white asphalt which can be easily colored with any desired pigment. The addition of 4 percent of titanium oxide, for instance, gives a creamy white. Effective reds and yellows, greens and blues have been made with as little as 2 percent of other pigments.

(Continued)

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Now, every user of emulsifiers should re-evaluate Atlas Spans and Tweens in connection with his needs. When *you* make this re-evaluation, consider this fact too: The Atlas HLB system of choosing emulsifiers gives you a much-needed guide to the choice of ideal surface active agents to fit most requirements—often saving hours or even weeks of tedious experiments. It is based on empirical numbers representing the Hydrophile-Lipophile Balance of emulsifiers . . . makes it easier to determine which Span or Tween, or which combination of emulsifiers, is ideal for *your* work. It may show that *your* requirements call for a custom-made emulsifier, which Atlas will formulate.

You'll find the HLB system—first of its kind—described in detail in the Atlas Surface Active Agents book. Send for your copy today—seventy formulas make it a handy reference guide in producing various emulsions. *And remember!* The prices of Atlas Spans and Tweens are down to pre-war levels.

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Water condensing or splashing into marine lubricants can wreak havoc on metal parts. So emulsifiers like the Atlas Span* and Tween* products are added to the oil to combine water into harmless emulsion form. The same principle applies in making slushing compounds, cutting oils, hydraulic fluids.

Paper Window Drapes Dripping Moisture?

Paper drapes and lampshades are chemically conditioned to prevent brittleness. But in humid weather, some conditioners attract too much water. Result: Dripping drapes. Atlas sorbitol is popular as a conditioner because its narrow humectant range helps prevent both wet and dry weather problems.

Renex Helps Boost Value of Detergent Sanitizers

Excellent low-cost detergent sanitizers, for dairy equipment, fountain and bar glassware, are compounded with Renex* non-ionic detergent. Renex is especially well-suited for this because it is compatible with cationic germicides and often steps up their germ-killing power, too! Atlas will supply typical formulas for either powders or liquids to compounders.

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ATLAS INDUSTRIAL CHEMICALS DEPARTMENT

CHEMICALS ATLAS EXPLOSIVES

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The materials have not yet been tested under traffic, but a small area in four colors at the Laboratory is giving promising results. Trial areas on roads and footpaths are being planned and the results of large scale trials on public roads should be available in a few months.

British Cutbacks in Imports From U. S. Do Not Affect Chemicals

London—No cuts in the dollar allocations for imports of chemicals from the western hemisphere have been made by the British authorities. Informed trade circles do not expect that imports of chemicals will be adversely affected by the official announcement that dollar imports as a whole must be cut by 25 percent pending long-term arrangements for the resuscitation of the sterling area's balance of payments. In general, the quantities of dollar chemicals entering the British market are small; savings through cutting down of imports would be more than offset by production and export difficulties in consuming industries as the amount entering individual manufacturing processes is mostly very small. Sulphur is the only commodity of chemical interest which is imported into Britain in large tonnages from the United States. It could be replaced to some extent either by Sicilian sulphur or alternative acid-making materials, but technical difficulties are understood to be in the way of a major change-over.

As far as carbon black and petroleum derivatives are concerned, the position is expected to rectify itself before long when the new plants built in Britain are put into commission. United Carbon Black Ltd. has just announced that the first bulk production of carbon black has started at its works at Swansea, South Wales, which is operating a furnace process. This is the first of the three carbon black plants being built in Britain to reach the production stage, and when all three are complete, most of the carbon black imports, which recently ran at an annual rate of $8 million dollars, will become superfluous.

British Petroleum Chemicals Ltd., joint subsidiary of the Anglo-Iranian Oil Co. and Distillers Co. Ltd., has begun work on the erection of its plant at Grangemouth where, as reported earlier, the capacity of the

(Continued)

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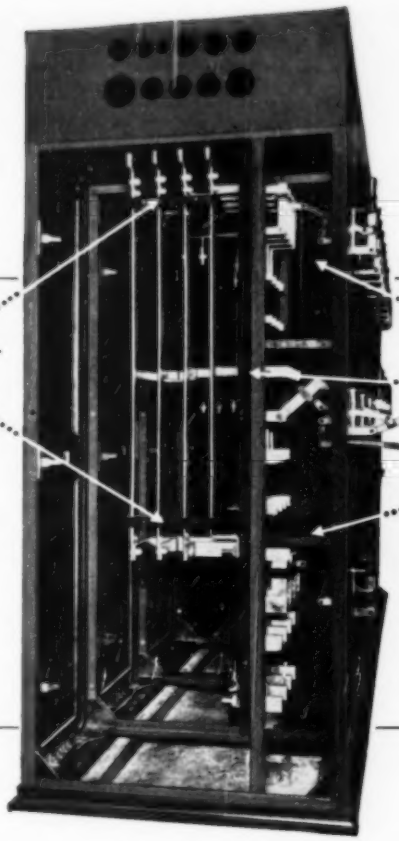

In addition to bus supports and mounting panels of K&M Ebonized Asbestos, this Pringle Switchboard has separators of K&M Monobestos—another versatile K&M material that betters electrical equipment.

High dielectric strength, high physical strength and high adaptability, all count in placing Ebonized Asbestos in much of the precise electrical equipment. Precision manufacture under high pressure, using specially developed raw materials, provides a product that can be readily machined, cut and drilled.

Pringle Electrical Manufacturing Company, Philadelphia, applies K&M Ebonized Asbestos to bus supports and mounting panels of the Dead Front Safety Knife Switch illustrated. The electrical safety factor is inherently high per unit of material. So is the mechanical safety factor, because there is strength in all directions with K&M Ebonized Asbestos. It particularly resists shock, vibration and temperature fluctuation.

These characteristics are valued by designers and engineers, for switchboard mountings, bus bar runs, compartment linings, test tables, bench boards and related applications. With K&M Ebonized Asbestos available in thicknesses from 1/8" to 4", any requirements can easily be met. For additional details write us; we'll answer you promptly.

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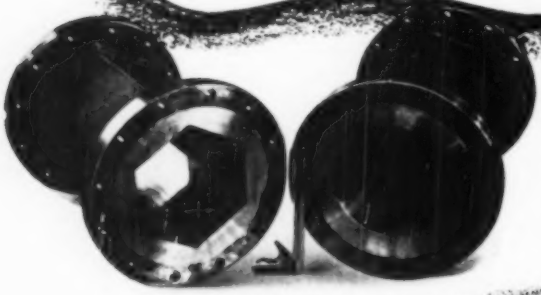
DURASPUN

18-8 Centrifugal Castings



...specified "centrifugal" because uniform, close-grained metal was wanted

These castings are sections of a special fractionating column, cast and flanged as illustrated at the right; machined and finished at the left.

Why **centrifugal** castings, you ask?

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FOREIGN NEWS, cont. . .

Anglo-Iranian's oil refinery is being expanded to 1,500,000 long tons. It is hoped that the petroleum chemicals plant there will be completed by the end of 1950. It has also been announced that Courtaulds Ltd., the rayon producer, has found it necessary to expand the plant at Trafford Park, Manchester. This unit makes some of the basic chemicals needed for rayon production.

PEROXIDE PRODUCTION

Another branch of chemical manufacture in Britain which is expanding is production of hydrogen peroxide. Laporte Chemicals Ltd. is the leading producer in the country. The company hopes to obtain the first production from its new plant at Warrington in the last quarter of this year and has decided to embark on a second stage of development in this locality. Meanwhile the older works at Luton have been completed and developed according to plan. Nevertheless the total output is being disposed of, and the question of dismantling some of the older plants seems to have been shelved, at least for the time being. The National Titanium Pigments Ltd. in which Laporte Chemicals Ltd. is interested has received permission to proceed with the erection of a new titanium oxide plant at Grimsby, on the East coast of England. It is preparing plans to start construction work.

Britain's chemical export trade suffered a disappointing setback to $26,400,000 in June, compared with $32,000,000 in May, although shipments to South Africa improved before the temporary closing of the market by Union Government action. Consignments to India and Pakistan reached a new record level. Comparison of British chemical exports in the first half of 1949 with the corresponding period of 1948 shows an advance by $25,600,000 to $178,000,000 but this increase was entirely due to larger shipments to India, Pakistan and South Africa. Australia, Eire, Sweden, France, Egypt, and the United States all took smaller amounts of British chemicals. Some British firms believe that the restrictions on dollar imports introduced in some sterling countries will help them to maintain their position in these markets. As an example the chairman and deputy-chairman of Philblack Ltd., visited Australia early this year to investigate the situation there. They came to the conclusion that the Australian market does not warrant the erection of a carbon plant at present. They hope to supply from

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This new folder tells you all about Kaylo Pipe Insulation—the available sizes and recommended thicknesses for various temperatures; physical characteristics; efficiencies, and heat losses.

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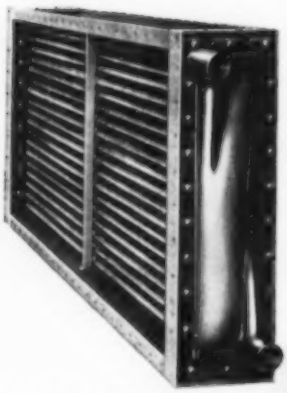

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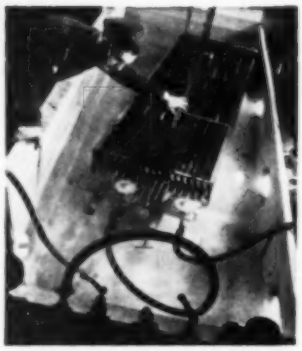
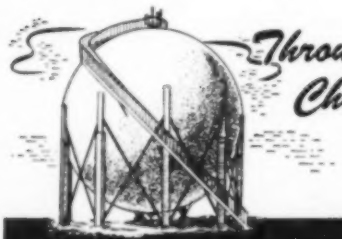
Over 25 years' experience, combined with unequalled production facilities, enables Aerofin to select just the right surface and materials for each particular job. Aerofin rigidly controls every phase of the production of its heat-transfer coils and units.



This man is looking for air bubbles - he is testing Aerofin heat-transfer coils with air pressure in a specially illuminated tank. If there are no bubbles, it means the immersed Aerofin unit has withstood the severe strains of steam and hydrostatic pressure tests and is ready to give you long, efficient service.



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FOREIGN NEWS, cont. . .

their British plant, to come into production in 1950, the Australian requirements which are now met from U. S. sources. Producers of petroleum chemicals, synthetic detergents and other new products of the chemical industry also hope to develop the Dominions market further when their output saturates the home market.

National ownership of all British mineral resources is recommended by the Mineral Development Committee set up three years ago to "consider possibilities and means of the coordinated, orderly and economic development in the national interest" of mineral deposits (except coal, oil, ironstone and other substances of widespread occurrence), and the Government has accepted this recommendation. It is thus to be expected that a Mineral Development Commission will be appointed which, though largely technical in character, will hold the ownership rights over most mineral deposits in the country. Of special interest to the chemical industry are the Committee's inquiries into the extent of existing non-metallic deposits. There is enough salt and gypsum for an indefinite period, enough china clay for at least 100 years, fuller's earth for at least 50 years, barites for up to 20 years, and fluorspar for between 15 and 20 years. About the potash borings in Yorkshire the committee has little to say. By February, the first borehole drilled by Imperial Chemical Industries Ltd., which company is in charge of the exploratory work, had reached a depth of 5,500 feet but not adequately penetrated the limestone strata. Indications of a substantial thickness of potassium minerals were, however, obtained which "are promising enough to justify further exploratory work." It is still too early to say how the potash will be recovered if commercial-scale production proves possible, but it appears that interest may turn to the recovery of potassium chloride either by mining or by a solution method rather than by pumping potassium-bearing brine, a method ICI favored early in 1948.

The National Coal Board is embarking on a big reconstruction program for coking plants as many of the existing batteries are old and inefficient. Good progress is now reported to have been made in the building of a new coking plant at Nantgarw, South Wales, which includes 48 under-jet Simon-Carves ovens designed to carbonize 7,000 tons of coal a week. The plant is expected to be in operation by the end of 1950. At the

(Continued)

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FOR: Fuel and Process Lines and Fire Protection Systems

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CMH REX-FLEX Fire-Proof Flexible Metal Hose is available in sizes from 5/16" to 6" I.D. with a choice of standard fittings. Write for latest data and specifications for your requirements.

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In certified tests, CMH Fire-Proof Metal Hose was subjected to 10 hours continuous internal fire — without damage! It also withstood an external flame of over 2000°F. for over fifteen minutes—again without failure!

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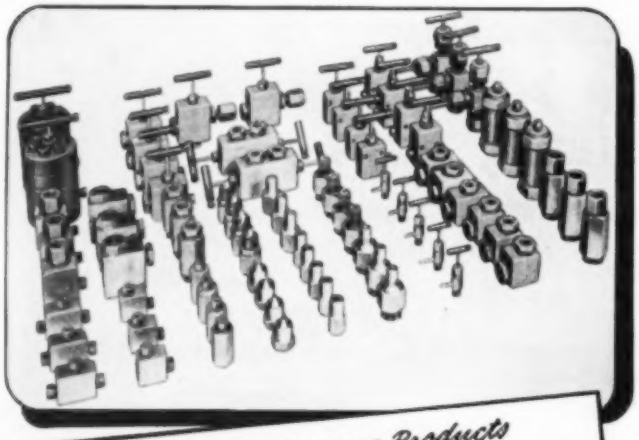
Special valves up to 3 in. pipe size can be built for pressures up to 10,000 psi.

Fittings include couplings, elbows, tees, crosses, adapters, connectors (gage, gas-tank and electrical), and bushings for connecting one size of tubing to another.

Tubing of stainless steel and other alloys for pressures up to 100,000 psi.



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Standard volumes, 43 ml. to 20 liters, for pressure up to 60,000 psi and temperatures up to 800° F.

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coking plant at Coedely, where work is continuing, the first 20 Coppee ovens are to be finished this summer. Orders have been placed for extensions in the East Midlands, the plans are being made for large plants in various localities in South Wales, East Midlands, Yorkshire, and the Northern Division of the Board. As far as coal tar distillation is concerned, the board's by product plants at present distill only a quarter of the crude tar they produce. It is proposed to distill a larger proportion of the total tar output in the board's own plants. Various byproducts are being exported by the National Coal Board—pitch to France and Spain, crude tar to France, creosote oil and hot pressed naphthalene to America, and benzol fractions and liquid ammonia to Europe.

Standard of Jersey Studying Sites for Dutch Refinery

Amsterdam—Leading executives of Standard Oil of New Jersey arrived in the Netherlands last month to study the possibility of establishing a large refinery at Rotterdam. Previous press reports that they had already decided on Antwerp instead of Rotterdam are denied. There are already two refineries at Rotterdam, one Royal Dutch and one Caltex.

Alberta To Get Big Beet Sugar Unit

Vancouver—Erection of a new beet sugar plant to cost $5,000,000 is in progress at Taber, Alberta. The plant was originally scheduled to start production this season, but plans have been enlarged and the unit will handle its first beet in 1950. Delay in supply of equipment was the main cause of postponement.

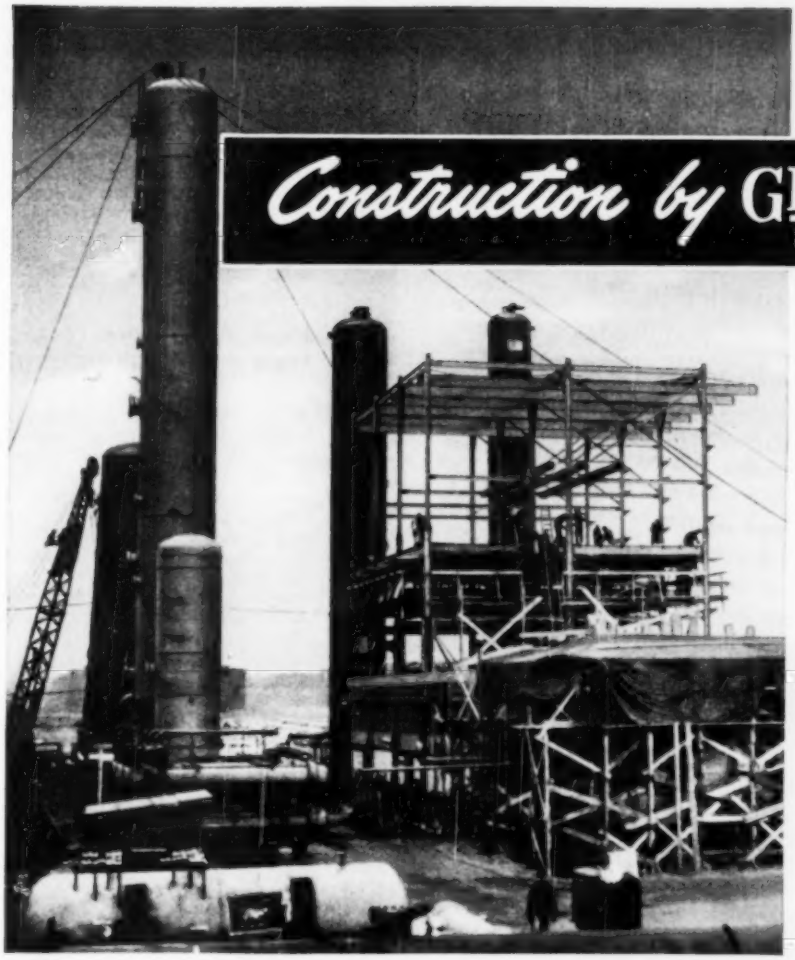
Australia Plans Huge New Refinery

Melbourne—The division of industrial development, Department of Postwar Reconstruction, in a report issued in Melbourne recommends construction of a modern refinery with a capacity of 500,000 tons a year. Australia's existing five refineries together treat 649,000 tons of crude a year.

The report does not state whether the government or one of the foreign oil firms is to carry out the project. However, the government is already in the oil business through its con-

(*Continued*)

Construction by GRAVER



View at left shows tower tanks fabricated and erected by Graver.

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Closely identified with the expansion and modernization programs of the petroleum and process industries, the Graver Construction Co. offers a comprehensive service that covers all phases of practically any type or size of project. It starts with engineering and planning and carries through material procurement to finished erection. Complete Graver equipment and experienced personnel are ready at strategic locations to start your job. Whether it's maintenance and repair, expansion or modernization of existing equipment, or installation of new facilities . . . call Graver *now*.

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A DIVISION OF GRAVER TANK & MFG. CO. INC. EAST CHICAGO, IND.

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in metered pressure pumping of
SULPHURIC ACID
...at all concentrations

Here is the equipment which will handle sulphuric acid, in all concentrations, performing the dual function of taking the acid from atmosphere pressure to line pressure, and metering or proportioning its flow. Because the Pulsafeeder has no stuffing box—but uses instead an hydraulically-balanced diaphragm seal, it eliminates leakage, prevents corrosion of pump or contamination of product, avoids loss of prime—all at lowest possible maintenance. Hundreds of satisfactory installations to back up these claims!

- NO STUFFING BOX OR RUNNING SEAL
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PULSAFEEDER
PISTON-DIAPHRAGM CHEMICAL PROPORTIONING PUMP

WRITE for Bulletin 262 with complete description and specifications.
LAPP INSULATOR CO., INC., PROCESS EQUIPMENT DIVISION, 106 MAPLE STREET, LE ROY, N. Y.

trolling interest in Commonwealth Oil Refineries Ltd.

The project has been devised as a contribution to the construction of refining capacity in the sterling area. While the sterling area produces more crude oil than it uses, it is partly dependent on American plants for refined products. No existing refinery in Australia produces aviation fuel, but this is to be one of the principle fractions of the projected installation.

Dutch Develop New Plastic From Rubber and HCl

Amsterdam—Stork-Chemie N. V. of Hengelo will begin production of a new kind of plastic called Rulalvd, which was developed by the Rubber Foundation of Delft. It combines rubber latex and hydrochloric acid to form an improvement over pliofilm with unexpectedly new possibilities. It is claimed that the new product will usher in a new phase for the natural rubber industry, particularly in competition with the synthetic product.

New Rayon Firm Formed Down Under

Melbourne—Formation of Australian Viscose Co., Ltd., with capital of $100,000 foreshadows some positive action on the long-planned establishment of an Australian rayon filament industry.

Australian Viscose was established with the backing of powerful Australian textile interests to negotiate with Oscar Kohorn & Co. Ltd., New York, for the supply and erection of plant for rayon filament production in Australia.

Ralph von Kohorn, one of the vice presidents of the company, recently spent several weeks in Australia at the invitation of the Department of Post-war Reconstruction.

It is understood that the Australian plant will be designed to produce tire cord yarn, the major synthetic which has still to be imported from the United States. Other filaments are now for the most part supplied by European producers.

Briefs . . .

Ottawa—Work has started on an $860,000 research laboratory for the Science Service of the Agriculture Department, Canadian Government, on the University of Western Ontario campus in London, Ont., it is reported. —*End*

DUSTUBE IS THE FEATURE VALUE

from every point of view . . .

PLANT MANAGER — Mr. F. C. Mallery
(A Gypsum Plant . . . name on request)

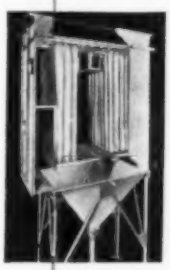
"From a managerial standpoint, the Dustube Dust Collector has been a profitable investment for numerous reasons. (1) ***Product Recovery*** — a daily saving of several dollars in valuable dust formerly exhausted over the countryside (2) ***Employee comfort*** — respirators are no longer necessary, exhaust from Dustube collector cools and ventilates in summer time. (3) ***Power savings*** — costly individual exhaust fans at dust creating points were eliminated."

MASTER MECHANIC — Mr. William P. Froman
(A Gypsum Plant . . . name on request)

"The condition of tubes in the Dustube can be inspected readily at all times without removal or use of any special tools — only a few minutes every several weeks is required for this job. The automatic and efficient shaking of the tubes, thoroughly removes all dust without any cloth wear. We have had absolutely no repair expense with our Dustube."

PACKAGED GOODS FOREMAN — Mr. H. L. Shaffer
(A Gypsum Plant . . . name on request)

"A marked improvement in employee efficiency resulted through the installation of our Dustube Dust Collector with the elimination of dusty conditions in the plant. Although the heavy dust was not harmful, its presence slowed down production and lowered the morale of our workers"



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BETTER DUST REMOVAL—Simple, fast, thorough. Shortens cleaning time.

POWER SAVINGS—Lower resistance to air flow. Lower air velocities.

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EASE OF INSPECTION—Clean, safe, simple. No parts to remove.

DUSTUBE FILTERS—No abrading metal contact. Easy to ship, store and handle.

FILTER REPLACEMENT—Takes only a few seconds. Requires no tools.

No matter what your point of view may be, you will find the Dustube is a profitable investment. If you belong to management, you will find your profit margins will be greater as Dustube costs less to operate and maintain. If you work on the maintenance crew, you will have more time to spend on other work for Dustube seldom requires maintenance. Or if a worker, you will find that you feel more like working and can turn out a better day's work when there is a Dustube in your plant.

Yes, it pays to own a Dustube. It pays off in dollar and cents savings that will pay the original cost of the Dustube in a surprisingly short time.

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The Corrosion Forum

EDMOND C. FETTER, *Assistant Editor*

Hydrofluoric Acid versus Construction Materials

Part I of a symposium in which a representative group of construction materials are evaluated for services involving HF.

Stainless Steel

W. G. RENSHAW, *Allegheny Ludlum Steel Corp., Brackenridge, Pa.*

Like hydrochloric acid and the other hydrogen halides, hydrofluoric acid is also a reducing agent capable of destroying the protective or passive film that is essential for the good corrosion resistance of the stainless steels. When this protective film is removed the acid can attack all of the stainless steels.

Therefore none of the stainless steels are recommended for service where hydrofluoric acid solutions of any concentration are involved even at low temperatures except in the case of anhydrous hydrogen fluoride at room temperature. The bifluoride (acid fluoride) salts behave the same as hydrofluoric acid and cannot be handled by any of the stainless steels.

Unlike the chloride salts, the normal fluoride salts do not cause pitting or localized attack of the stainless steels in slightly acid solutions. Instead the reaction is merely a general over-all type of corrosion attack with no pitting except in some instances at the air line due to concentration effects and where crystals of the salt have formed due to evaporation. Of all the various stainless steel grades Type 316 offers the best corrosion resistance in these solutions, although it is necessary to know complete details of service before an accurate recommendation can be made.

The addition of nitric acid or other strong oxidizing agents to dilute hydrofluoric acid almost completely inhibits attack of the stainless steels in most cases. For example, descaling of the austenitic stainless steels after annealing can be accomplished with very little, if any, attack upon the metal itself because of the inhibiting effect of nitric acid in the bath. The inhibiting effect of strong oxidizing agents will become less as the hydrofluoric acid concentration is increased beyond a few percent. For instance, in a 90-percent-nitric-plus-5-per-cent-HF solution at 100 deg. F., corrosion of Type 310 has been clocked at a rate of 0.2 in. per yr., Type 316 at 0.3 in. per yr.

In spite of the rather limited field for stainless steel in hydrofluoric acid or fluoride applications, it can be seen that under certain conditions stainless steel is suitable. Recommendations for any such applications should be based on actual tests, however.

Hastelloy Alloys

C. G. CHISHOLM, *Haynes Stellite Co., Kokomo, Ind.*

Because of the many problems involved in corrosion testing of metals in normal glass laboratory ware, little laboratory data is available on corrosion rates in hydrofluoric acid. Tests run in 48 percent hydrofluoric acid at room temperature, in wax bottles, showed that Hastelloy alloys, A, C, and D were very resistant when the samples were completely submerged. Alloy A showed a loss of 4.5 mils per year; alloy B a loss of 2.4 mils per year; and alloy C, no loss after a 96-hr. period. When the samples were approximately ¾ submerged in the solution, a preferential attack occurred above the water line, particularly on alloys A and D. The rate increased to 13 mils per year on alloy A, and 24 mils on alloy D. While alloy C showed some slight etching above the water line, it still showed an over-all corrosion rate of only 4.8 mils per year.

Typical reports from chemical concerns testing these alloys under plant operating conditions are shown in the accompanying table.

In previously published articles, the statement has been made that Hastelloy alloys A and B, when exposed to aqueous hydrofluoric acid, suffered severe attack in the form of intergranular corrosion; and that, accordingly, these alloys are not resistant to hydrofluoric acid. These results were based upon a single test, and they were not completely checked with the successful field performance of these alloys in handling hydrofluoric acid.

One manufacturer has used Hastelloy alloys successfully for approximately 10 years, in equipment subjected to immersion in the fumes of hot hydrofluoric acid during the process of frosting light bulbs. Another manufacturer reports outstanding performance with alloy B in handling anhydrous hydrofluoric acid at elevated temperature, for such equipment as bolts, trays, and racks.

These and other successful applications indicate that the Hastelloy alloys may have useful resistance to hydrofluoric acid; and, where other materials are giving unsatisfactory life, tests are warranted.

Iron and Steel

A. W. SPITZ, *American Cyanamid Co., New York, N. Y.*

Carbon steel is extensively used for handling hydrofluoric acid in concentrations above 75-80 percent and temperatures under 150 deg. F. With concentrations under 70 percent at atmospheric temperature or anhydrous acid over 150 deg. F. the corrosion rate is too high to make the use of carbon steel practical for most applications. Cast iron is attacked by hydrofluoric acid in most concentrations and its use is not recommended.

Hardened steels in hydrofluoric acid service may be subject to embrittlement; no such difficulties have been reported with soft, low carbon steels.

Formation of a scale on carbon steel surfaces in anhydrous hydrofluoric acid

(*Continued*)

Corrosion Rates: Hastelloy Alloys in Hydrofluoric Acid

Acid Conditions	Temperature, Deg. F.	Duration of Test, Days	Hastelloy B	Hastelloy C	Hastelloy D
80% HF	60-80	150	8.4	5.2	
99% HF	68	180	0.07	0.07	2.6
24% HF	room		2.5	2.3	
40% HF	room	56	2.4	2.4	1.0
40% HF	110	2	5.0	55	
22.5% HF and 35% H_2SF_6	110	30	6.0	9.0	8.0
93% HF and isobutane	215	49	3.0	2.0	
85.2% HF and 1.6% water and oils	220-250	45	4.5	2.1	

Better 8 ways for pumping

BLACK LIQUOR

1. LASTS LONGER—thanks to heavier wear-resisting parts, minimum wearing parts.
2. LIQUOR CAN'T SEEP PAST THREADS—no internal studs or bolts to cause maintenance woes.
3. ELIMINATES MOST PACKING TROUBLES—thanks to low pressure stuffing box with gland under suction pressure only.
4. MINIMUM WEAR BETWEEN SUCTION DISC AND IMPELLER—thanks to extra-heavy suction disc liner.
5. INTERCHANGEABLE PARTS—pump parts of different alloys can be furnished to suit various concentrating of caustics.
6. FITS INTO EXISTING SYSTEM AS READILY AS IN NEW ONE—because suction and discharge nozzles swivel to 72 possible positions.
7. EASILY DISMANTLED—impeller can be removed without disturbing piping or bearings.
8. INTERCHANGEABLE SHELL—for left and right hand rotation.

For maintained high output — fewer shutdowns — minimum repair costs — specify MORRIS TYPE R SLURRY PUMP.

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service may cause trouble where moving parts are involved. Where large clearances are not permissible, use of another metal which will not scale is indicated.

Protective Coatings for Fatty Acids

(NOTE: *The following was inadvertently omitted from the symposium on fatty acids published here in the April, May, June and July issues.*—Editor)

FRED L. SHARPE, JR., *General Coating Co., Woodbridge, N. J.*

Phenol-formaldehyde thermo-setting (baked phenolic) synthetic resin coatings have been used with excellent results in applications involving fatty acids. Specifically, a baked phenolic coating having a minimum coating thickness of 0.004 in. to 0.006 in. can be recommended for fatty acid application at operating temperatures ranging up to approximately 100 deg. C.

Fatty acid fumes can be safely handled at temperatures up to approximately 375-400 deg. F.

Baked phenolic coatings have been successfully used as a lining for fatty acid storage tanks, shipping containers, and exhaust systems to prevent corrosion and to insure contamination-free products over an extended service period.

The baked phenolic coating represents an economical method of protecting plant equipment used in fatty acid service.

KENNETH TATOR, *Kenneth Tator Associates, Coraopolis, Pa.*

The characteristics of fatty acids of significance in the selection of resistant organic materials are: (1) Relatively low corrosion rates; (2) freedom from ionization; (3) function as an organic solvent.

Compared to strong corrosives such as hydrochloric acid, where the average rate of corrosion of mild steel will go to about one inch per year, fatty acids corrode steel at the rate of about 4 mils per year. Thus except where the base metal is more rapidly corroded, as magnesium or zinc, deterioration of equipment, pipelines and tanks is usually not a motive for corrosion-proofing against fatty acids, but rather the prevention of objectionable contamination of the fatty acids with the products of corrosion, such as dark-colored iron or toxic lead soaps.

Therefore it is quite satisfactory to

(*Continued*)

DURCO PRESENTS A NEW, IMPROVED PLUG VALVE

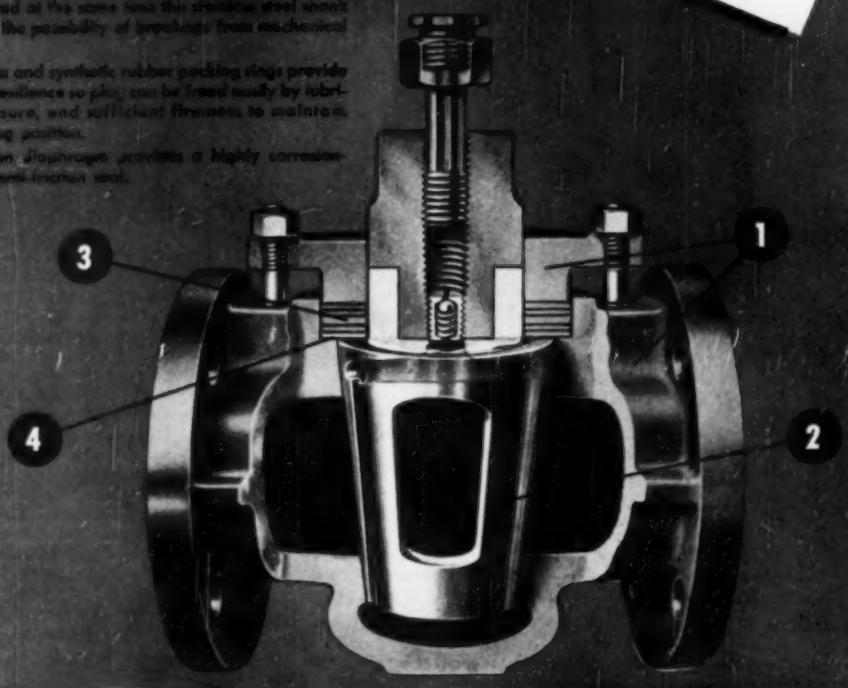
FOR CORROSIVE SERVICE

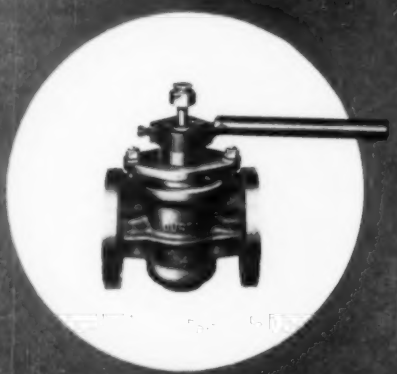
1. This new valve is regularly produced and stocked with body and gland of Durimet 20, the superior stainless steel. The Type A valve is also available on special order in other corrosion resisting alloys, such as Chlorimet, Monel metal and Nickel.

2. The composite plug used in the Type A valve is a new Durco development. The plug proper is of Durion and the shank is of stainless steel. This assembly is permanently bonded and permits the full use of the excellent corrosion resistance and wearing properties of Durion, and at the same time the stainless steel shank precludes the possibility of breakage from mechanical shock.

3. Durable and synthetic rubber packing rings provide sufficient resilience so plug can be freed easily by lubricant pressure, and sufficient firmness to maintain proper plug position.

4. A Teflon diaphragm provides a highly corrosion-resistant, anti-friction seal.





The DURCO Type A is a top lubricated plug valve for general chemical service at pressures up to 150 lbs.

The mechanical design, as well as the composition of the alloys used in the construction of this valve, are the result of 37 years of intensive corrosion research. Special tooling and quantity manufacture make it possible to offer this valve at a very attractive price.

Available sizes: 1", 1½", 2" and 3". Delivery all valves with Durimet 20 bodies and composite plugs from stock.

Write for a copy of Bulletin 636-C. If you prefer, a DURCO engineer will be glad to discuss valve problems with you, at any time.

DURCO

THE DURIRON CO., INC.
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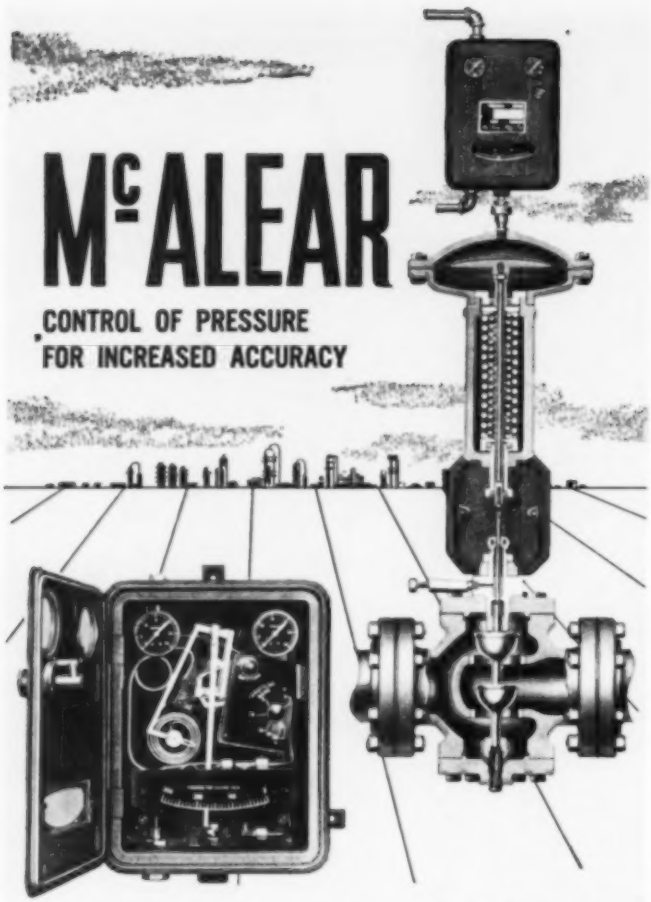

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These McAlear units offer a completely coordinated "package" for installation wherever sensitivity of control is required.

McAlear No. 115 and No. 116 Diaphragm Motor Valves—Equipped with ball bearings and multiple springs. No. 115 is spring opened and pressure closed while No. 116 is spring closed and pressure opened. Available in semi-steel or cast steel, or other metals, suited to various pressures, temperatures and services. Sizes from ½" to 12".

McAlear No. 1500 Pilot — Employs spiral sensitive spring which reduces hysteresis to minimum. Adjusted or converted to reverse action without use of tools. Indicator shows controlled pressure. May be mounted on valve or remotely (surface or flush) without alteration. Full range of operating pressures available. Write for Bulletin No. 150.

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protect with the less expensive lining materials available in thin brushed or sprayed films, even though these may present an occasional discontinuity by imperfect application or subsequent damage. Fatty acids are neither water-soluble nor electrolytes so galvanic corrosion cannot exist at such imperfections in the lining. Where the fatty acids are mixed with water and electrolyte however these latter will corrode at the same or lesser rate as in the absence of the fatty acid, and such protective measures must be taken which would ordinarily be required for the handling of aqueous solutions of that electrolyte.

Elimination of contamination of fatty acids by corrosion products is 99.99 percent complete if 99.99 percent of the base metal surface is continuously covered with an inert barrier, and it is a poor application, or extensive damage, which will cause 0.01 percent of the contact area to be exposed to the base metal.

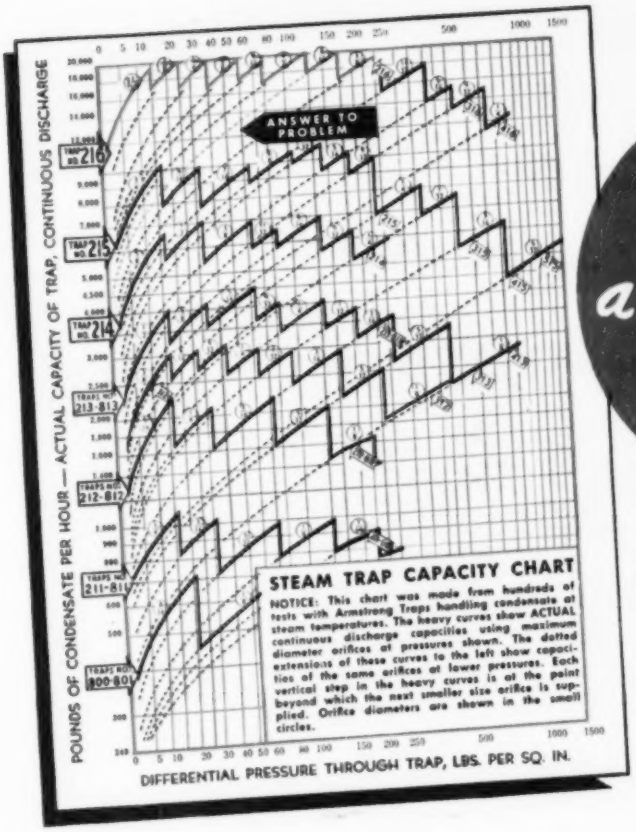
Fatty acids have a real solvent action approximating that of hydrocarbon solvents, hence organic barriers which are softened or dissolved by hydrocarbons should be avoided. For this cause we can reject polystyrenes, polyethylene, natural rubber and GR-S rubber. Butyl rubber, neoprene and buna N, although not appreciably affected will be slightly tendered by fatty acids.

This same solvent action will in many instances slowly leach out plasticizers from otherwise resistant materials and hence such materials as the polyvinyl acetate, chloride or their copolymers, and vinylidene chloride preferably should be plasticized if required with non-soluble plasticizers. If such leaching occurs the films will ultimately fail through embrittlement and shrinkage stresses.

PHENOLIC IS FINE

There is one material which after consideration of all of these factors stands out as eminently suitable: the baked phenolic lining. It is completely resistant to solvent action, contains no plasticizers, and is readily and inexpensively applied. It will withstand continuous temperatures up to 375 deg. F., is adherent, presents a hard glass-like surface easy to clean. It is, however, limited in application thickness to 10 mils, but as has been discussed previously this is no disadvantage in the case of fatty acids.

Air dried or baked vinyls or vinylidene chloride are also satisfactory but with such applications occasional examination of the linings should be made to anticipate any tendency toward ultimate film failure by plasticizer extraction. —*End*


ANSWER TO PROBLEM
TRAP NO. 216
TRAP NO. 215
TRAP NO. 214
TRAPS NO. 213-813
TRAPS NO. 212-812
TRAPS NO. 211-811
TRAPS NO. 209-809
POUNDS OF CONDENSATE PER HOUR — ACTUAL CAPACITY OF TRAP, CONTINUOUS DISCHARGE
DIFFERENTIAL PRESSURE THROUGH TRAP, LBS. PER SQ. IN.
STEAM TRAP CAPACITY CHART
NOTICE: This chart was made from hundreds of tests with Armstrong Traps handling condensate at steam temperatures. The heavy curves show ACTUAL continuous discharge capacities using maximum diameter orifices at pressures shown. The dotted extensions of these curves to the left show capacities of the same orifices at lower pressures. Each vertical step in the heavy curves is at the point beyond which the next smaller size orifice is supplied. Orifice diameters are shown in the small circles.

BECAUSE good trapping starts with selection of the right trap for the job, Armstrong has provided all the data necessary for correct trap selection in the Armstrong Steam Trap Book. The Capacity Chart reproduced here is taken from this handy reference work. By means of this chart, any engineer can select the correct traps for his requirements. Here is a typical problem showing how the chart is used:

Given: An evaporator condensing 6000 lbs/hr at 50 psi when the steam is first turned on, but condensing only 1000 lbs/hr at 150 psi at the end of the process. Safety factor of 2 to 1 required at the *minimum* pressure differential.

Solution: Referring to the chart, the No. 216 Armstrong Trap with 7/16" orifice for 150 psi pressure has a capacity of 12,000 lbs/hr at 50 psi. This provides for the 2 to 1 safety factor and is, therefore, the correct trap for the job.

The Armstrong Steam Trap Book provides recommended safety factors for different services and handy tables to help you calculate condensing rates. Other useful data included are: hook-up diagrams; do's and don't's; trouble-shooting tips; prices and specifications. You're welcome to a copy. **ARMSTRONG MACHINE WORKS, 858 Maple Street, Three Rivers, Michigan.**

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A new bulletin to help you improve filtration efficiency and reduce costs

New Dicalite Technical Bulletin B-12 is latest published information on the use of diatomaceous filteraids for general industrial filtration.

The principles and operating procedures learned by Dicalite engineers in 20 years, involving all kinds of liquids and liquors filtered today, are presented briefly in this booklet. The origin and nature of diatomaceous filteraids are discussed. A typical filtration system and how it operates is described. Accepted methods of obtaining maximum efficiency at minimum cost are given, as well as ways to avoid the most common operating difficulties. Subject matter has been revised (supersedes Bulletin B-11) to include latest data and applications in new fields.

SEND FOR YOUR COPIES OF BULLETIN NO. B-12

Much of the content of this booklet is of a practical operating nature and we would be glad to send sufficient copies for your production as well as technical staff. If you have copies of our Bulletin B-11 in your files, please request a copy of this new bulletin for replacement.

DICALITE DIVISION, GREAT LAKES CARBON CORPORATION

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Names in the News

Benjamin S. Sampson has been appointed manager of the industrial furnace and oven division of Claud S. Gordon Co., Chicago.

Roger Macdonald has been made plastics service representative for the New England and eastern sales district of the chemical division of Koppers Co. He will be located in New York. **S. J. Katz** has been made assistant manager of the western sales district, operated jointly by the tar products and chemical divisions.

R. E. Bridges has been appointed superintendent of Humble Oil & Refining Co.'s Gulf Coast division. He replaces **C. W. DeLancey** who has retired after more than 30 years of service. **R. K. Tracy** succeeds Mr. Bridges as assistant division superintendent.

R. E. Bridges

C. L. Arnold

Chester L. Arnold has been named director of research for the Stauffer Chemical Co. Dr. Arnold, formerly director of research, western division, will continue his personal supervision of western research activities. **John F. Crowther,** formerly assistant director of research, has been made director of the eastern research division.

George E. Gilliam has been named to manage pyrometer supplies sales nationally for Brown Instruments division of Minneapolis-Honeywell Regulator Co. He will make his headquarters in Philadelphia.

William H. Corwin has been appointed public relations director for Taylor Instrument Cos., Rochester, N. Y.

Charles S. Lawrence has been appointed executive secretary of the Institute of Food Technologists and business manager of Food Technology, the official organ of that society.

Tom K. Smith, Jr., has been made manager of plasticizers and resins sales for the organic division of Monsanto Chemical Co.

Fred Schmidt, formerly president of Electric Power Equipment Corp., has joined I-T-E Circuit Breaker Co. as assistant to the president. Mr. Schmidt will be a coordinator of sales and engineering activities within the company.

James B. Pipkin, assistant to the president of the Texas Co. since 1944, has been named assistant to the chairman of the board. **J. T. Wood, Jr.,** former manager of the Pacific coast division, producing department, succeeds Mr. Pipkin as assistant to the president.

John B. Eisen has joined the staff of Bjorksten Research Laboratories as section leader at their Madison, Wis., laboratories. He was formerly with the chemical research laboratories of American Viscose Corp., Marcus Hook, Pa.

Clifford L. Ayers has been made rubber products manager of the Flintkote Co., New York. He will head the activities of the rubber section of the industrial products division.

M. B. Smith has joined the staff of Davies Nitrate Co., Inc., as chemist in charge of production control and product development at their laboratory in Metuchen, N. J.

Henry P. Reid has been elected to the newly created office of vice president in charge of engineering of the United States Steel Corp., subsidiary, Universal Atlas Cement Co. **Charles B. Baker** has been made assistant to the president.

Frederick Fahnoe has joined the staff of the chemistry department of Kellex Corp. He will be located at their Jersey City, N. J. laboratories.

Henry A. Lardy will receive the $1,000 Paul-Lewis Laboratories Award in Enzyme Chemistry at the 116th national meeting of the American Chemical Society which opens in Atlantic City September 18. **Dr. Agnes Fay Morgan** will receive the 1949 Francis P. Garvan Medal honoring women in chemistry.

Anthony J. Wirpsa has joined E. F. Houghton & Co. as supervisory chemist in the paper products division. He will head a program to develop the use of chemicals in pulp and paper mills.

Charles W. McKimmon has been appointed chief chemist of the Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., to succeed **Samuel S. Heide** who has retired. **Simon R. Dean** succeeds Mr. McKimmon as assistant chemist.

Morgan M. Hoover has joined the staff of *Chemical Engineering*, New York, as assistant editor. Hoover, a graduate in chemical engineering from Rensselaer Polytechnic Institute, has had some nine years of varied engineering and production experience in industry. He comes to *Chemical Engineering* from the Piney River, Va., plant of American Cyanamid Co. Before that he was with E. I. du Pont de Nemours & Co. in Virginia and at Hanford Engineer Works in Washington.

M. M. Hoover

F. M. Mason

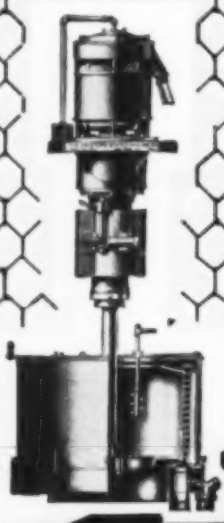
Frank M. Mason, Jr., has been appointed director of engineering for Fairbanks, Morse & Co., Chicago. He was formerly manager of the research division in charge of all research, developments and patents.

Charles J. Knuth has joined the research staff of Chas. Pfizer and Co., Brooklyn, N. Y.

Harry A. Cooper has been elected president of the Alloy Casting Institute, New York. Mr. Cooper is

(*Continued*)

THE ROBERTS FLUID DRIVE
CENTRIFUGAL
IS REALLY A HONEY



In this machine and in this machine alone are the following features to be had:

Standard motor, with current peak less than 40% of direct connected (special) motor drives.

Uniform torque . . . adjustable application.

Simple adjustment for accurate speed control.

And further, the inherent design of the Roberts Fluid Drive Centrifugal allows special characteristics to be incorporated with ease, thus suiting it exactly to your individual application. Your inquiry will have our full and prompt attention.

ROBERTS
The WESTERN STATES MACHINE COMPANY
HAMILTON, OHIO U.S.A.

NAMES IN THE NEWS, *cont. . .*

president of Cooper Alloy Foundry Co., Hillside, N. J.

Walter D. Schmidt has joined the design branch, plants division, technical command, Army Chemical Center, Md., as a chemical engineer. **Samuel C. Harris** and **Robert A. Pearce** have joined the operations branch of the same division, also as chemical engineers.

Paul John Blatz has been added to the research staff of the Houdry Process Corp., Philadelphia.

Max M. Muller has been made works manager of the Ohio operations of Basic Refractories, Inc., of Cleveland.

Rolf Bie has become affiliated with United States Foreign Corp., New York.

Boris Sway has been elected president of Texo Corp., Cincinnati. Formerly, he was vice president in charge of production.

David J. Price has retired from the United States Department of Agriculture after 37 years of Federal Government Research Investigations. His services are available for consultation for investigations of dust explosions and for design and operation of chemical research laboratories.

Francis N. Hayes and Theodore J. Neubert have been made assistant professors of chemistry at Illinois Institute of Technology. **Elliot S. Nachtman** has been named instructor in metallurgical engineering and **Bernard Rabinovitch** has been appointed instructor in physical chemistry.

E. R. Traxler has been named manager of the new flat belting field engineering and development department for B. F. Goodrich Co.'s industrial products division.

Herbert Insley, chief of the mineral products division of the National Bureau of Standards and **F. P. Hall**, assistant director of research of the Onondaga Pottery Co., were presented with the Ross Coffin Purdy Award of the American Ceramic Society at the annual convention in Cincinnati.

Joseph M. Maloney has been named to the research department, Hall Laboratories, Inc., Pittsburgh. He will specialize on problems of condensate line corrosion and its control.

Clyde C. Randolph has been made works manager of the Tonawanda Plant in Buffalo and the Allentown Plant in Allentown, Pa., of the Western Electric Co. He has also been made acting works manager of the company's Point Breeze Works in Baltimore.

W. E. Mahin has been named director of research at Armour Research Foundation of Illinois Institute of Technology. He succeeds **Dr. Martin H. Heeren** who will be director of applied research with the sapphire division of Elgin National Watch Co.

W. E. Mahin

W. S. Lowe

William S. Lowe has been elected executive vice president of A. P. Green Fire Brick Co., Mexico, Mo. Mr. Lowe was formerly with Reeves-Ely Laboratories, Inc., New York.

H. L. Miner, manager, safety and fire prevention division, E. I. du Pont de Nemours & Co., Inc., has been named chairman of the safety code correlating committee of the American Standards Association.

Roy F. Morse has been appointed food technologist in the research laboratories of Monsanto Chemical Co.'s phosphate division in Anniston, Ala.

Harold Hornbeck and Harry Whitaker have been assigned to the research laboratories of the Hilton-Davis Chemical Co., Cincinnati. **Richard Torbeck** has been added to the pharmaceutical division and **David Moore** to the engineering department.

Homer F. Johnson has been made assistant professor of chemical engineering at the University of Tennessee, Knoxville.

H. McKinley Conway, Jr., has been named as the first director of the Southern Association of Science and Industry, a non-profit, non-political organization devoted to

promotion of industrial research as a solution to Southern economic problems.

Emil Ott, Hercules Powder Co. director of research, has been named by the National Research Council as one of six delegates to represent the United States at the Council meeting of the International Union of Chemistry in Amsterdam this month.

Myron T. Herreid has been appointed vice president and general manager, gas and coke division of Koppers Co., to succeed the retiring **W. Reed Morris. M. W. Gaylord,** formerly plant engineer for the division's St. Paul plant, has been named production manager.

H. M. Corley has been appointed manager of the chemical division of Armour and Co. He will be responsible for chemical plant management and operation, chemical sales as well as chemical market development.

Aubrey E. Harvey has been named associate professor of chemistry at the University of Arkansas, Fayetteville, Ark. **Donald R. Smith** has been made an assistant professor of chemistry.

J. Charles Allen has been made chief engineer of Atlas Powder Co., Wilmington, Del. **Charles G. Hersh** becomes assistant chief engineer.

John Boehm has joined the Fish Constructors, Houston, who are building the Transcontinental Gas Pipe Line.

Morgan Jones has been appointed superintendent of the Mancely Chemical Co. plant at Wheatland, Pa. He was formerly a production superintendent with the Calco chemical division of American Cyanamid.

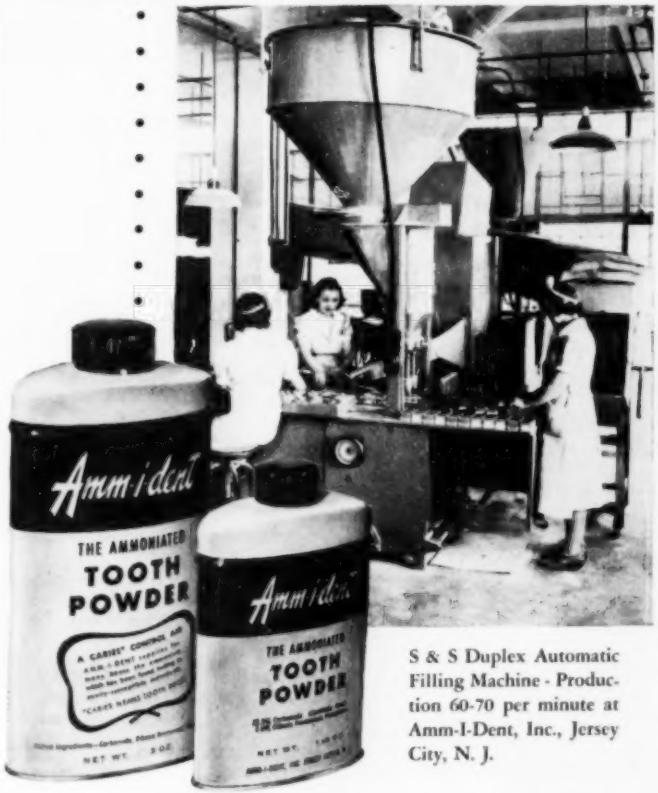
Arthur B. Elliott has been sent to Victoria as assistant manager of Du Pont's nylon plant under construction. He is assistant mechanical superintendent of Du Pont's Sabine River works at Orange but he will be in complete charge at Victoria until a manager is named.

James R. King has joined the chemicals department of the Quaker Oats Co. He was formerly with Argonne National Laboratory in Chicago.

D. Robert Yarnall has been elected chairman of the board of James G. *(Continued)*

ANOTHER S&S COMBINATION

FOR SUCCESSFUL PACKAGING



S & S Duplex Automatic Filling Machine - Production 60-70 per minute at Amm-I-Dent, Inc., Jersey City, N. J.

There is an S & S Filling Machine suitable for filling practically any powder or granulated product and at speeds to suit your needs.

15 - 30 - 60 - 120 per minute

We also make a complete line of packaging equipment • Carton Filling & Sealing • Flexible Packaging • Tight Wrapping Machines Paper Box Making Machines for "Set-Up" Boxes

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Subsidiary of Food Machinery and Chemical Corporation

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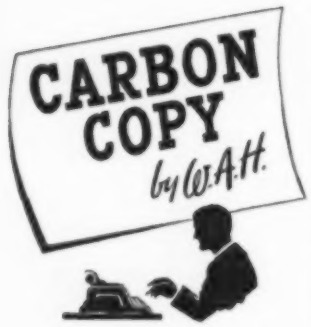

(No. 5)

Activated Carbon As A Chemical Engineering Process

The use of activated carbon is now accepted as one of the processes of chemical engineering whereby separation of materials can be effected. It takes its place beside such older methods as filtration, distillation, solvent extraction, precipitation, sedimentation.

Where activated carbon is used as a purifying medium, it is, as a rule, applied as the last step in a series of purification processes. Its function is to remove by adsorption those impurities which escaped removal by preceding steps.

There are cases, however, where activated carbon as a purifying medium plays the role of purity maintenance—such as with dry-cleaning solvent or electroplating solution.

In another type of application, activated carbon is used as a concentrating agent as in the production of anti-biotics. In this case, the desired product—not the impurities—is adsorbed on the carbon and then recovered in more concentrated form by a suitable eluting agent.

DARCO

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CORPORATION
60 East 42nd St., New York 17, N. Y

NAMES IN THE NEWS, cont. . .

Biddle Co. **J. Robert James** has been elected president.

F. W. Archer has been appointed chief engineer of Monsanto (Australia) Pty. Ltd.

Paul J. Brodeur has been appointed chief chemist of the metal finishing division of the Pyrene Manufacturing Co., Newark, N. J.

F. C. King has been appointed assistant manager of General Petroleum Corp.'s engineering department. He formerly worked on maintenance engineering at the company's Torrance, Calif., refinery.

James Hoxie has been made assistant plant manager of Oliver United Filters' plant at Hazleton, Pa. **Clarence Hansen** has been assigned the duties of acting superintendent at the company's Oakland plant, the position formerly filled by Mr. Hoxie.

Amos Turk, formerly of the chemistry department, City College of New York, has been appointed director of research and development of the W. B. Connor Engineering Corp., New York.

Martin P. Teller has been named vice president in charge of engineering at Gimpel Machine Works, Philadelphia, Pa.

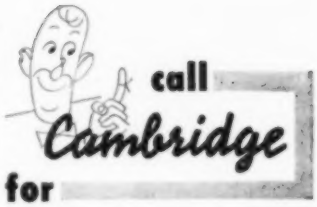
E. V. White has joined the chemistry department of the University of British Columbia. He will teach organic chemistry.

W. A. Severance has been made chief chemist in charge of research and development, product control and special customer problems in the field of corrosion-proofing for Ceilcote Co.

Charles W. Taylor has resigned as general superintendent of the American Thread Co., Easthampton, Mass. He has accepted a position as manager at Kilburn Mills, New Bedford, Mass.

Wendell Latimer, at his own request, has been relieved of his duties as dean of the University of California college of chemistry and chairman of the department of chemistry. **Joel Hildebrand**, professor of chemistry, has been appointed to succeed him. The change is effective for the current academic year. Dr. Latimer, who has been dean of the

(Continued)



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Whether you need material for filtration, screening or fabrication, Cambridge offers you one complete source for any type of wire cloth or metallic screen. Skilled Cambridge craftsmen produce your material from any gauge metal or alloy, to the particular mesh or weave that best suits your requirements.

Call in your Cambridge Field Engineer whenever you need industrial wire cloth. He can offer you *fast delivery on stock or specially woven items.*

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trays · crates · screens
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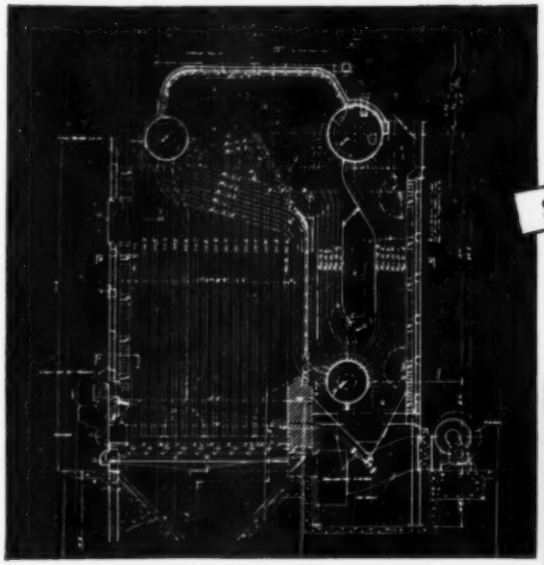
OFFICES IN PRINCIPAL INDUSTRIAL CITIES

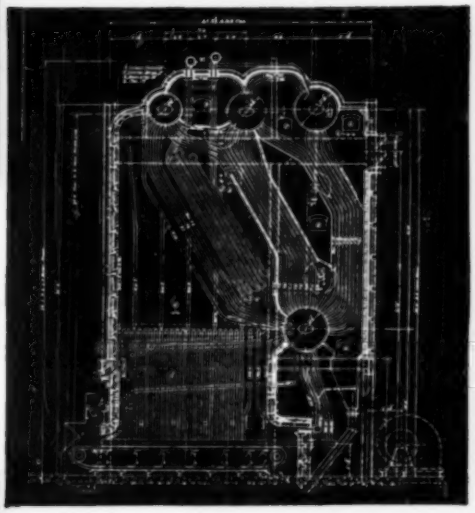
Quick Steaming at all Ratings!



Carry high overloads with high efficiency

SPECIFY Vogt

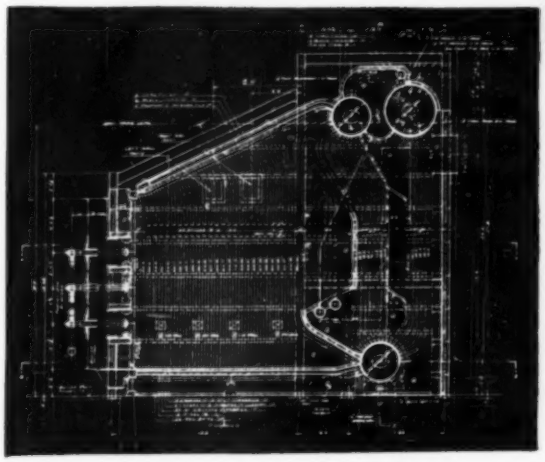
STEAM GENERATING UNITS



CLASS VL Two 27,500 pounds per hour units, installed at Brown-Forman Distillers Corporation, Louisville, Ky. Features large furnace volume in limited space, with high ratio of radiant heating surface.

CLASS LE Mt. Carmel Public Utility, Mt. Carmel, Illinois, is served by this 60,000 pounds per hour unit. Generous steam liberating surfaces and steam space permit wide fluctuations in load.

CLASS VR 70,000 pounds per hour steam generator at Humble Oil and Refining Company, Johnsone, Texas. An efficient, high-duty unit with water cooled furnace, using refinery gas fuel.



Vogt builds a complete line of bent tube steam generators, designed to burn solid, liquid, or gaseous fuels to meet specific operating conditions. Superheaters, air preheaters, economizers, water walls, and soot blowers can be readily incorporated. Bulletins with general information and showing typical installations are available upon request.

HENRY VOGT MACHINE CO.

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BRANCH OFFICES:
NEW YORK, PHILADELPHIA, CLEVELAND
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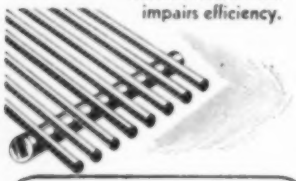
FIGURES DON'T LIE!

● "Figures don't lie," says the scholar; "But liars do figure," says the cynic. YOU do your **own** figuring and, any way you figure it, B-Z precision-welded Round-Rod screens **can** show you worthwhile profit on the roughest, toughest jobs in the industry. Job records show B-Z screens pile up as much as **30 times** the life of ordinary screens before wear impairs efficiency.



Prove it!

It costs you nothing to get the new catalog describing the many applications in which B-Z Round-Rod Screens are **multiplying** screen life . . . **slashing** costs. Write for it, read it — then let us quote on B-Z Screens for **you**, without cost or obligation.

Get out your own slide-rule . . . do your own figuring — we'll gladly stake our case on **your** findings.

BIXBY-ZIMMER
ENGINEERING CO.

Dept. 49, 961 Abingdon St., Galesburg, Ill.

Names in the News, cont. . .

College since 1941, requested that he be relieved of the post in order that he might return to active research work.

E. D. Anderson has been appointed chief engineer of the Western Supply Co. of Tulsa.

Gustave T. Reich, consulting chemical engineer, has moved his offices to 1422 Chestnut St., Philadelphia 2, Pa.

M. Merlub-Sobel will be in New York until the end of October to deal with inquiries which have come to him as chairman of the Technological Committee of the American Technion Society regarding scientific and technological problems in Israel.

Donald G. Clark has retired from the Gulf Oil Corp. because of ill health. He has been director of purchases of the Gulf companies since 1939. He will continue to act in an advisory capacity.

Lyle B. Lathrop has been added to the pharmaceutical research department of Abbott Laboratories.

W. H. Tisdale has been appointed special assistant to the technical director of Du Pont's Grasselli chemicals department. At the present time Dr. Tisdale is on special assignment in Honduras in connection with the development of prospects for pest control chemicals in Latin America.

H. D. McKinley has been appointed works manager of the new degreasing-solvent manufacturing plant being erected by Hooker-Detrex, Inc., at Ashtabula, Ohio.

L. B. Dobbins has been appointed supervisor of plant engineering by Air Reduction Sales Co. He will administer plant engineering matters not assigned to the general engineering division.

Ju Chin Chu has been appointed associate professor of chemical engineering at Polytechnic Institute of Brooklyn, N. Y. He was formerly a technologist for Shell Chemical Corp., Calif., and after that an assistant professor of chemical engineering at Washington University, St. Louis.

R. R. Scholar, formerly plant engineer at Stauffer Chemical Co.'s Rich-

(Continued)

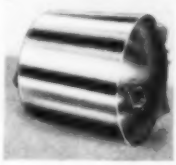
EXCELLENT VALUE!
Durable, welded
STAINLESS STEEL
STOCK POTS
by "METALSMITHS"

5 to 50 gallon sizes in stock

"Metalsmiths" Stock Pots are made of heavy-gauge stainless steel, butt welded by the heliarc process, using no filler rod or flux. All welds ground smooth. Wired edge on top, fixed handles, rounded corners at bottom, free from crevices and wrinkles. Available polished or unpolished, with or without covers as desired. Also available in monel or inconel. Other "Metalsmiths" utensils include stainless steel pails, dippers, measures, funnels, scoops, beakers, dye and starch buckets, batch cans, shovels.

WRITE for illustrated price list.

SPECIAL TANKS TO SPECIFICATION



Storage tanks, pressure tanks (shown), vacuum tanks made to your specifications by craftsmen in corrosion-resistant metals. Let us quote on your needs.

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Division of
Orange Roller Bearing Co., Inc.
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Piccolyte

the Versatile Resin

Drives your costs down . . .

Keeps your quality up!

Can you use these Piccolyte Properties ?

LIGHT LEMON COLOR
HYDROCARBON STRUCTURE
NO ACIDITY
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CHEMICAL RESISTANCE
SOLUBILITY IN ALIPHATIC NAPHTHAS
THERMOPLASTIC
COLOR STABILITY

Low-cost, high-quality PICCOLYTE provides many useful properties that enable you to reduce costs without sacrificing any of your product's values. Not only is Piccolyte low in cost, but it is readily soluble in low-cost solvents. Easy to use, because it is compatible with waxes, oils, other resins and other ingredients.

Send for a free sample, specifying intended use.

PICCO

PENNSYLVANIA
INDUSTRIAL CHEMICAL CORP.
CLAIRTON, PENNA.

Makers of Coumarone Resins • Coal-Tar Solvents • Styrene Resins • Rubber Plasticizers • Reclaiming Oils • Terpene Resins • High Solvency Naphthas • Solvent Oils

Plants at Clairton, Pa. and Chester, Pa.

Distributed by:
Pennsylvania Falk Chemical Co., Pittsburgh 30, Pa.
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Harwick Standard Chemical Co., Akron 5, Ohio

ONLY a modern plant can assure continuing profits in the face of growing competition. Do you enjoy all the advantages of a modern plant? Or are your profits suffering, due to inefficient operating methods, obsolete equipment or inadequate facilities?

Many companies with critical operating problems are finding the practical way to attain peak production efficiency and top profits—through *plant modernization* by EBASCO.

EBASCO offers you any or all of the following:

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NAMES IN THE NEWS, cont. . .

mond, Calif., plant has been transferred from his chemical engineering duties to a new assignment at the Niagara Falls plant of New York Ohio Chemical Co. Scholar will serve as production manager of the plant.

Langford M. Godfrey is new manager of agricultural chemicals division for Canadian Industries Ltd., western district, with headquarters at Vancouver, B. C. A graduate of the University of British Columbia, he served five years with the federal agriculture department before joining CIL in 1936. Godfrey succeeds **L. V. Clegg,** transferred to the company's head office at Montreal.

T. J. Gates has been advanced to maintenance control engineer at the Torrance, Calif., refinery of the General Petroleum Corp. Gates joined General Petroleum in 1946 after four years with the Chemical Warfare Service, U. S. Army. A native of Detroit, Mich., Gates received his degree in chemical engineering from Wayne University, 1942.

James F. Bell, assistant to the president of Portland Gas & Coke Co., Portland, since joining the organization in 1946, was recently elected vice president of the company. Bell will supervise the operating functions of the company, also the development and sale of byproducts. He is a Stanford graduate and served for a time with U. S. Smelting, Mining & Refining Co., later working on a national research council project at Harvard and Massachusetts Institute of Technology.

Homer D. Kemalyan, chemical engineer, has joined the division of metallurgical research of Permanente Metals Corp., Spokane, Wash. He was formerly with Golden State Co., Ltd., San Francisco.

William L. Nelson has been named manager of industrial chemical sales of the Great Western division of the Dow Chemical Co. At the same time, **J. H. Scism** was named assistant manager of industrial chemical sales for the division. Headquarters for both are San Francisco.

D. A. Rhoades, vice president and general manager of Permanente Metals Corp., was recently selected public relations committee chairman of

(Continued)

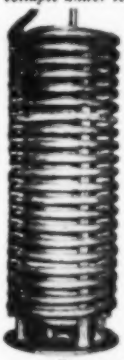
Now THE BEST COILS for Heating and Cooling H_2SO_4 are KNAPP PROCESS HOMOGENEOUS Pb COVERED COPPER COILS

FOR the first time such coils are available with all of these features: *Low cost! High corrosion resistance! Excellent heat transfer! High physical strength! Fabricating economy! Simplicity of repair! Excellent fatigue resistance!*

HOMOGENEOUS Lead Covered copper coils improve on the performance of other mediums (when used to heat or cool H_2SO_4 and solutions).

1 Compared with the hard metals: *Better corrosion resistance! Better heat transfer! Lower initial cost! Longer life!*

2 Compared with lead pipe coils: *Better heat transfer! Lower initial cost (or great improvement in heating cycle, at your option)! Extended life as coils are rigid and will not fatigue or collapse under temperature cycles!*



KNAPP PROCESS

Homogeneous Lead Covered copper tubing is fabricated on homogeneous lead-covered steel legs. Such legs eliminate unsatisfactory lead spacer blocks. They provide rigid construction and permit the tubing to expand and contract freely.

Operating Data

Coils may be operated at steam pressures up to 150 psi and the homogeneous bond between copper and lead will withstand up to 500°F. The strength of the coil in respect to internal pressure and rigidity relies solely on the copper tubing, thus the homogeneous lead covering may be kept at a minimum.

Tubing available in lengths or coils for your own fabrication

SEND FOR

a sample of homogeneous Pb covered copper as produced by the Knapp Process. No obligation.

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PLANTS AT: Wakefield, Mass. · Long Island City, N. Y.
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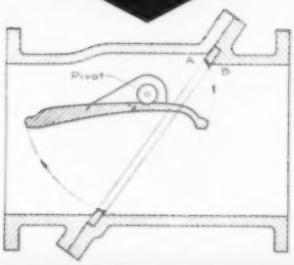
MAINTENANCE COSTS ARE LOWER

when you have **CUSHIONED CLOSING**

of—CHAPMAN CHECK (TILTING DISC) VALVES



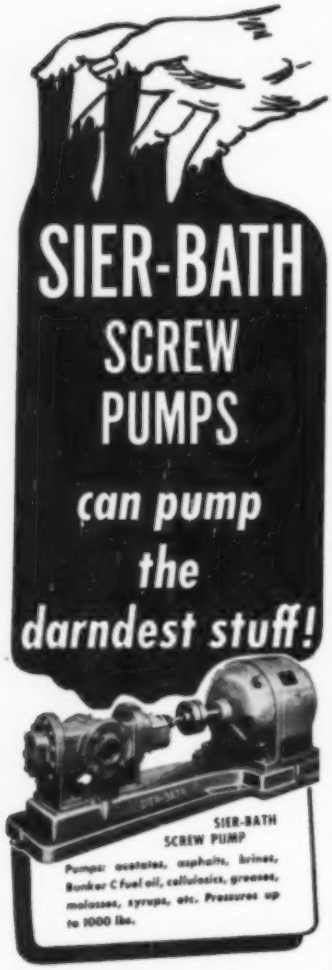
Cross-section of the Chapman Tilting Disc Check Valve illustrating the way that the balanced disc is supported on the pivot, with arrows showing the travel of the disc. A feature of the design is that the disc seat lifts away from the body seat when opening, and drops into contact when closing, with no sliding or wearing of the seats.

That's right! Maintenance costs *are lower* with Chapman Check Valves . . lower because the balanced disc works *with the stream.* There's no slamming to cause destructive pipe line stresses and increase maintenance costs. Nor is there any rubbing on seats . . . the disc closes quickly and quietly with no sliding or wearing action.

Yet that's only half the story. Head losses are actually 65% to 80% lower than for conventional type check valves. And, when used on pump discharge lines, substantial power savings are possible.

Why not write today for engineering data and reports of tests.

THE CHAPMAN VALVE MFG. COMPANY
INDIAN ORCHARD, MASSACHUSETTS



No matter how gooey the stuff, it can't "gum up the works" in a Sier-Bath Screw Pump. The powerful thrust of its screw moves materials so viscous that they are often in a semi-solid condition.

The simple design (only two moving parts) and accurate but sturdy construction, make these screw pumps long-lived and keep them relatively free of maintenance. They are available in horizontal and vertical models. Send for booklet.

ALSO MANUFACTURERS OF SIER-BATH GEAREX ROTARY PUMPS AND SIER-BATH PRECISION GEARS

FOUNDED 1905 MEMBER A.G.M.A.

Sier-Bath
GEAR and PUMP CO., Inc.

9259 HUDSON BLVD., NORTH BERGEN, N J

NAMES IN THE NEWS, cont. . .

the Aluminum Association. Mr. Rhoades, a member of the Kaiser organization for about 20 years, is responsible for the operation of ten plants, including six which compose the aluminum division and four chemical division facilities. He is a graduate of the University of California.

Paul B. Slawter, Jr., vice president of The House of J. Hayden Twiss, has been appointed director of public relations for the American section of the Society of Chemical Industry.

L. H. Wright has been named manager of the fertilizer sales division of Phillips Chemical Co., Bartlesville, Okla.

Henry A. Thouron has joined the export department of Hercules Powder Co. He will cover sales of Hercules products in western Europe. Formerly, Mr. Thouron was assistant director of sales of the synthetics department.

W. S. Robertson, Jr., has been appointed assistant district sales manager, New York office, of the standard products section of Du Pont's ammonia department. **G. S. Demme** has been made director of sales of the acetate division, rayon department.

William Townsend has been named vice president in charge of sales of the Pennsylvania Flexible Metallic Tubing Co. He was formerly sales manager.

William S. Vaughn has been elected an assistant vice president of Eastman Kodak Co. He has been with the company for over 20 years.

Charles S. Whittington of Greenwood, Miss., has been elevated to the presidency of Mississippi Chemical Corp. from his former post of first vice president, it is announced by the board of directors. He succeeds **John S. Williams, Jr.**, who died recently.

T. W. Simmons, Jr., has been elected vice president and general manager of the Johnston Pump Co. of Los Angeles, Calif. Mr. Simmons was formerly president of Johnston Aquamatic Co., York, Pa. **Kenneth G. Lundie** has been appointed general sales manager.

J. F. Fitzsimmons has been named manager of Allis-Chalmers commer-

(Continued)

THEISEN
Stainless Steel
Products

SUPPLY TANKS
With cover & faucet
In 25, 50 & 100 gals.

BUCKETS
(with mesh strainer)
(removable cap)
In 10, 12 & 14 qts.

MEASURES
Tanks, Kettles, Sinks,
Pans, Baskets, etc.

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PUT ON THE HEAT

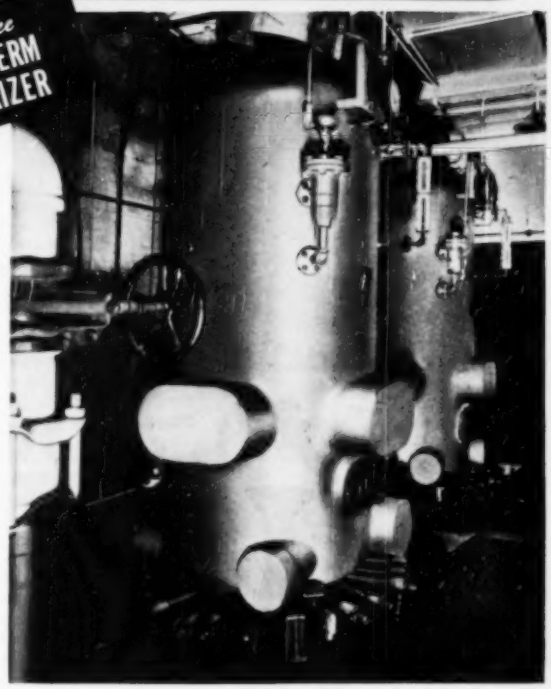
WITHOUT PUTTING ON THE PRESSURE

McKee DOWTHERM VAPORIZER

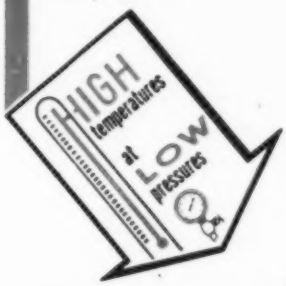
That's exactly what you do when you get Dowtherm's High Temperatures (up to 650 degrees F. at Pressure as low as 55 lb.). Investigate the many advantages of using the McKee Dowtherm Vaporizer, which makes unnecessary the use of costly, complicated, high pressure equipment.

Dowtherm gives you uniform heat transfer at a rapid rate and under perfect control, without the direct-heat application risks of burning, scorching or product discoloration.

This accounts for the steadily increasing use of gas-fired McKee Dowtherm Vaporizers over a period of 15 years, in chemical processing plants located in practically every state.



The two 1,000,000 BTU McKee Dowtherm Vaporizers in highly successful operation at Sherwin Williams Co. plant.



You can get McKee Dowtherm Vaporizers in gas-fired or oil-fired models, and capacities of 33,000 to 2,000,000 BTU per hour — all complete, ready to install, and backed by one responsibility for successful performance. Write for Bulletin. Eclipse Fuel Engineering Company, 721 South Main Street, Rockford, Ill.

Representatives in the following cities:

Albuquerque, N. M.
Atlanta, Georgia
Boston 16, Massachusetts
Buffalo 17, New York
Chicago 3, Illinois
Cincinnati 6, Ohio
Cleveland, Ohio
Detroit 19, Michigan
Houston 4, Texas
Kansas City, Missouri
Los Angeles 11, California
New York 7, N. Y.
Philadelphia, Pennsylvania
Phoenix, Ariz.
Pittsburgh, Pennsylvania
Portland, Oregon
St. Louis, Missouri
San Francisco, California
Tulsa 3, Oklahoma
Wallingford, Connecticut

Eclipse Fuel Engineering Company
721 SOUTH MAIN STREET ROCKFORD, ILLINOIS

McKee Eclipse

13 ADVANTAGES of HARPER

NON-FERROUS AND STAINLESS STEEL EVERLASTING FASTENINGS

over the lower first cost of common steel

1. Resistance to Rust and Corrosion
2. Resistance to High Temperatures
3. Non-Magnetic
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9. Long Life
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12. Easy to Plate or Finish
13. Resistance to Abrasion and Wear

OVER 6000 ITEMS IN STOCK

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Morton Grove, Illinois (Suburb of Chicago)
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Branch Offices: Atlanta, Cambridge, Cincinnati, Cleveland, Dallas, Denver, Detroit, Grand Rapids, Los Angeles, Milwaukee, Oakland, Philadelphia, Pittsburgh, St. Louis, Seattle, Toronto (Canada).

HARPER

EVERLASTING FASTENINGS

NAMES IN THE NEWS, cont. . .

cial research department succeeding **J. R. Reed** who has resigned to establish his own business.

Walter L. Campbell has been made assistant advertising manager of Monsanto Chemical Co.'s Merrimac division.

R. Jack Manning, of the sales division of Du Pont's ammonia department has been transferred from Wilmington to New England to work more closely with paper, textile and leather industries.

Joseph E. Conklin has been appointed sales representative for Antara products, General Aniline & Film Corp., New York. **Henry C. Speel**, formerly a development engineer with the central sales department, has been transferred to Antara products where he will do sales engineer work.

J. H. Morrison has been appointed southeastern district manager of the laundry and dry cleaning division, Pennsylvania Salt Manufacturing Co.

Edmond G. Young has been put in charge of sales of Freon fluorinated hydrocarbon propellants by Kinetic Chemicals, Inc., Wilmington.

Sands G. Falk has been appointed manager of foundry sales of the Falk Corp., Milwaukee. He succeeds **John S. Wilkinson** who will become foundry sales consultant.

Seth Shorey has been appointed sales manager for organic and phosphate division products for the Merrimac division of Monsanto Chemical Co.

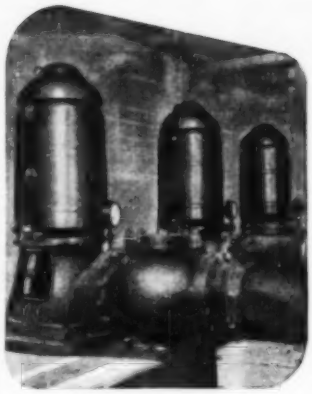
Roy Wallace has been named to a technical service post in the chemical division of Goodyear Tire & Rubber Co. He will supervise test installations and applications of chemical products and assist in the preparation of technical literature.

Norman C. Stephens, formerly with Union Oil Co., Oleum, Calif., has joined the chemicals department of Quaker Oats Co., Chicago.

Cather P. Louthan has been appointed to the technical service staff of Godfrey L. Cabot, Inc. He will be located in Akron, Ohio.

Percy L. Larsen has been appointed sales manager of the San Francisco

(*Continued*)



What About Checking On Operation Cost

HIGH EFFICIENCY BRINGS BIG SAVING!

In selecting a well water system, the matter of operation cost is of prime importance.

For nearly seventy years Layne has been steadily building more and more efficiency into their well water systems. Today they are accepted the world over as being the most economical to operate.

And supporting efficiency, there is an extra ruggedness of construction that insures the maximum amount of long life. Each unit is precision built of finest materials, resulting in a highly perfected and smooth operating system.

It is an acknowledged fact that Layne has built more fine well water systems than any other firm in the entire world. Furthermore, the Layne method of well construction and pump installation is recognized as being far superior to the usual procedure. And once installed, the Layne organization is always available to supply service and parts—when and if needed. For catalogs, bulletins, etc., address LAYNE & BOWLER, INC., General Offices, Memphis 8, Tenn.

LAYNE

WELL WATER SYSTEMS

AFFILIATED COMPANIES: Layne-Arkansas Co., Stuttgart, Ark. • Layne-Atlantic Co., Norfolk, Va. • Layne-Central Co., Memphis, Tenn. • Layne-Northern Co., Mishawaka, Ind. • Layne-Louisiana Co., Lake Charles, La. • Louisiana Well Co., Monroe, La. • Layne New York Co., New York City • Layne-Northwest Co., Milwaukee, Wis. • Layne-Ohio Co., Columbus, Ohio • Layne-Pacific, Inc., Seattle, Wash. • Layne-Texas Co., Houston, Texas • Layne-Western Co., Kansas City, Mo. • Layne-Minnesota Co., Minneapolis, Minn. • International Water Corporation, Pittsburgh, Pa. • International Water Supply, Ltd., London, Ont., Can. • Layne-Hispano Americana, S. A., Mexico, D. F. General Filter Company, Ames, Iowa

Engineers and Manufacturers
of
COMPLETE PLANTS AND EQUIPMENT
for
CHEMICAL PROCESS INDUSTRIES

Fabrication in Stainless and Carbon Steels, Copper, Aluminum, Nickel and Other Commercially Available Alloys

ABSORPTION TOWERS, FRACTIONATING COLUMNS, EVAPORATORS,
HEAT EXCHANGERS, PRESSURE VESSELS, REACTOR VESSELS,
PRE-FABRICATED PROCESS PIPING, SOLVENT EXTRACTORS, VEGETABLE OIL EXTRACTORS

VULCAN has served the process industries since 1901. Below is a representative list of chemicals processed in Vulcan plants or equipment.

ALCOHOLS Methanol — synthetic
Methanol — from wood distillation
Ethanol — industrial grades from molasses and grain
Ethanol — from sulfite waste liquor
Ethanol — anhydrous, Vulcan process
Ethyl alcohol — beverage, neutral spirits
Isopropanol Allyl alcohol Butanol

ALDEHYDES
Acetaldehyde Butyraldehyde Furfural

CHLORINATED HYDROCARBONS Chloroethane Chlorobenzenes Chlorotoluenes

ACIDS Formic acid
Acetic acid — from wood distillation
Acetic acid — from process residues and solvent recovery
Acetic anhydride Propionic acid
Butyric acid Stearic acid

GLYCOLS Ethylene glycol
Butylene glycol

KETONES
Acetone Methyl ethyl ketone

ESTERS Methyl acetate Ethyl acetate
Butyl acetate Vinyl acetate Dibutyl phthalate

HYDROCARBONS Butadiene Heptane
Benzene Toluene Styrene Diphenyl

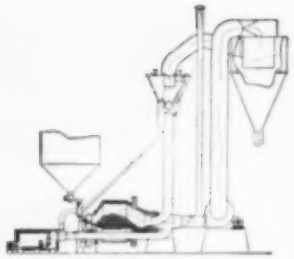
PHENOLS Phenol Naphthol

ETHERS Ethyl ether Isopropyl ether

MISCELLANEOUS Citronellal Geraniol
DDT Essential oils

Vulcan **distillation**
evaporation
extraction
processes and equipment

THE VULCAN COPPER & SUPPLY CO. *General Offices and Plant:* **CINCINNATI, OHIO**
NEW YORK SAN FRANCISCO BUENOS AIRES
IN CANADA — VICKERS-VULCAN PROCESS ENGINEERING COMPANY LTD. — MONTREAL



"Yep, it DRIES
while it GRINDS,
while it CLASSIFIES."

"Shure, the Hardinge 'THERMOMILL' is one of the slickest grindin' hook-ups I iver see.

"Y' take our raw feed, fer instance. It carries a lot of surface moisture. Well, I jist puts it through me 'THERMOMILL' an' its dried, ground an' sized all in one operation. No need fer us to buy a separate dryer.

"It's all automatic, too; since we put it in, me job's easier,—me product's better.

"If ye got dry grindin' moisture troubles jist write Hardinge. Tell 'em t' send ye Bulletin 17-B-11."

HARDINGE

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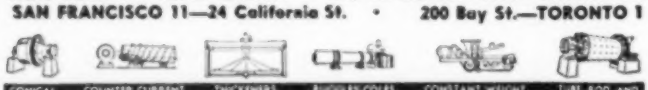
SAN FRANCISCO 11—24 California St. • 200 Bay St.—TORONTO 1



CONICAL MILLS · COUNTER CURRENT CLASSIFIERS · THICKENERS CLARIFIERS · RUGGLES-COLES DRYERS · CONSTANT WEIGHT FEEDERS · TUBE ROD AND BATCH MILLS

NAMES IN THE NEWS, cont. . .

sales district of Sharp & Dohme, Inc.

Earl J. Mills has been made manager of Diamond Alkali's southwest sales district. **Charles W. Klaus** has been put in charge of sales activities covering seven midwestern states.

Max A. Minnig has been appointed sales manager of the carbon black division, Witco Chemical Co. He will be located in Akron, Ohio, and will continue as vice president and director of Witco Carbon Co.

John W. Stevens has been named director of sales of the chemical division, Celanese Corporation of America. He will be responsible for sales of organic chemicals produced at their Chemcel plant, Bishop, Tex.

OBITUARIES . . .

Charles D. Burtenshaw, director in charge of engineering for Pulverizing Machinery Co., died June 22.

Charles J. Brand, 69, agricultural economist and author of many agricultural legislative measures, died in Washington, D. C., on June 29.

Charles Hosmer Morse III, vice president in charge of manufacturing, Fairbanks, Morse & Co., lost his life when the company's big Lockheed Lodestar two motor plane crashed near Roanoke, Ill., July 9.

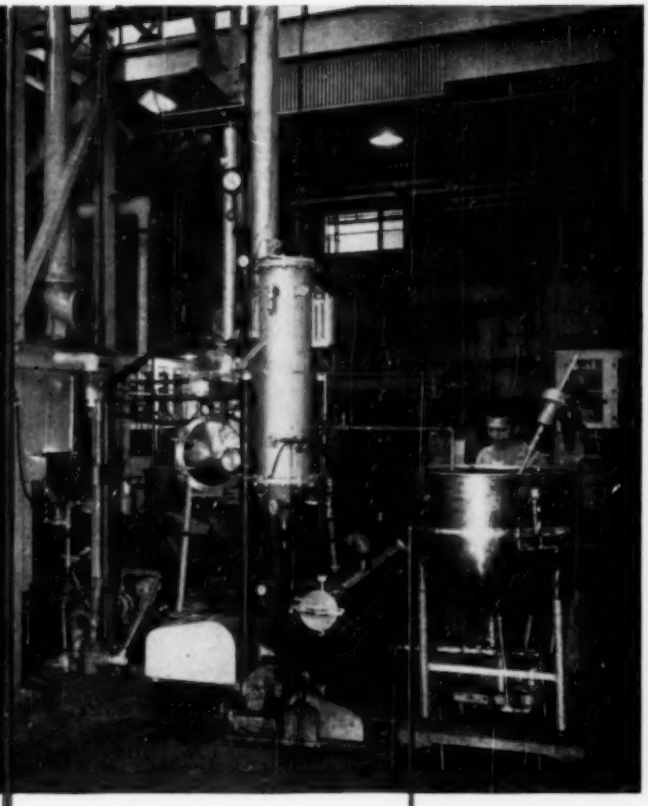
Edward J. Burnell, vice president and general sales manager and director of Link-Belt Co., died at his home in Winnetka, Ill., July 22.

William H. Sheffield, 74, president and general manager of Innis, Speiden & Co., died of a heart attack on July 26. Mr. Sheffield was a grandson of the founder of Sheffield Farms and a nephew of L. D. Halsey, another of the founders.

Jack M. Kavanaugh, 26, and **Keith W. Robinson,** 23, a chemist and a physicist respectively for Monsanto Chemical Co., Texas City, were killed in El Dorado, Ark., in the crash of a single-engine plane August 8. The plane, which was owned and piloted by Mr. Kavanaugh, crashed during a heavy rain.

Douglas Durrell Monroe, 49, assistant general sales manager of the Texas Co., died August 14 following an operation in Baltimore, Md.

Can we help you with your Experimental Work?



BUFLOVAK AT WORK ON ONE OF OVER 6,000 PROCESSING PROBLEMS

BUFLOVAK Equipment is available to process your product. The results are positive, right from the start. You will know every detail of cost, production, and characteristics of the finished product. This BUFLOVAK service is strictly confidential. Will help you to determine what equipment is needed to most profitably do your work.

The new BUFLOVAK Low-Temperature Evaporator, operating at temperatures as low as 58° F. and at safe pressures, brings improved results to a wide range of delicate liquids.

A complete line of BUFLOVAK Equipment for processing chemicals and foods, including Dryers, Solvent Recovery Equipment, and Processing Equipment, is available to complete your process on a pilot plant scale.

Full information on request.

BUFLOVAK EQUIPMENT

Division of Blaw-Knox Co.

1351 FILLMORE AVE. BUFFALO 11, N. Y.

DARNELL CASTERS

Extra Value

ANY WAY YOU MEASURE IT

FREE Manual

DARNELL CORP. LTD.
LONG BEACH 4, CALIFORNIA
60 WALKER ST., NEW YORK 13, N.Y.
36 N. CLINTON, CHICAGO 6, ILL.

INDUSTRIAL NOTES

Continental Can Co., Inc., New York, has appointed W. M. Cameron central division sales manager.

Koch Engineering Co., Wichita, Kan., has appointed Perry Kilsby Inc., Los Angeles, Pacific Coast representative for its fractionating trays.

Witco Chemical Co., Akron, has made Armstrong Industrial Supply Co., Trenton, its agent of carbon black sales in Trenton and Mercer County, N. J.

Negley Bag & Paper Co., San Antonio, Tex., has appointed Christ Paper Products Corp. as its sales representative in the Northeast area.

General Aniline & Film Corp., New York, has transferred the offices of its central sales development department to 22 Centre Sq., Easton, Pa.

Worthington Pump and Machinery Corp., Harrison, N. J., has expanded its water treating equipment sales division and transferred the division to its Dunellen Works at Dunellen, N. J.

New England Spectrochemical Laboratories, Ipswich, Mass., has purchased the outstanding stock of Skinner & Sherman, Inc., Boston.

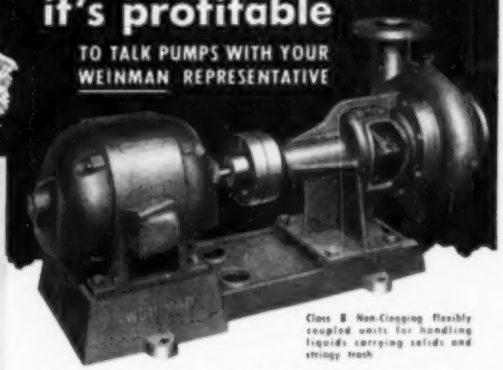
Parker Appliance Co., Cleveland, has appointed the Nielsen Hydraulic Equipment Co., New York, as distributor for O-rings in the metropolitan area.

Cambridge Wire Cloth Co., Cambridge, Md., has appointed two agents to distribute its line of woven wire conveyor belts to Canadian manufacturers. They are the R. D. Travers Co., Hamilton, Ontario and the Process Equipment Co., Montreal, Quebec.

National Engineering Co., Chicago, has appointed two new distributors of its line of mixers and valves. Reid Mitchell Associates of Chi-

(Continued)

it's profitable
TO TALK PUMPS WITH YOUR WEINMAN REPRESENTATIVE



Class B Non-Clogging flexibly coupled units for handling liquids carrying solids and stringy trash

for help on ANY pumping problem, write, wire or phone a Centrifugal Specialist... your WEINMAN representative

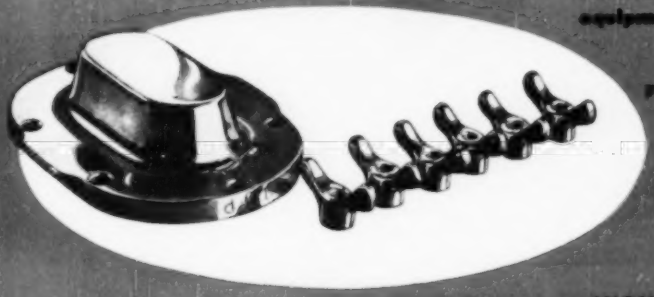
When you and your WEINMAN representative talk pumps, it's mutually profitable. You pose the liquid handling problems; he comes up with the solution. WEINMAN pumps are in daily use in chemical processing plants from coast to coast. Their design, application and installation are the sole concern of the WEINMAN organization. WEINMAN makes ONE product—pumps . . . with ONE purpose—to do your job most profitably.

Built by Centrifugal Specialists
The WEINMAN Pump Mfg. Co.
300 SPRUCE STREET • COLUMBUS 2 • OHIO

DIGGING
for your dinner!

The high quality and dependability of Sivyer castings is no more accident. It is the result of real "digging" . . . endless research, rigid control and scientific testing by Sivyer craftsmen and metallurgists.

The use of Sivyer castings in equipment manufactured by you safeguards the quality and ultimate efficiency of that equipment . . . in a substantial measure helps you dig for better results and profits.



SIVYER

SPECIALISTS IN HIGH ALLOY AND SPECIFICATION STEEL CASTINGS

SIVYER STEEL CASTING COMPANY • MILWAUKEE CHICAGO

"Sure, I'd wear a respirator . . .

. . . if it was comfortable!"

Respirator Style 45D

Respirators must fit properly and provide ease of breathing before workers stop risking their lungs—and your profits.

Protection must be combined with comfort. One without the other means a wasted investment in safety equipment. Here is a WILLSON lightweight respirator, approved by the U. S. Bureau of Mines for use in dusts and mists. It has gained wide acceptance in industry through workers' willingness to wear it. Normal breathing is assured through easily replaceable filters and a positive acting exhaust valve. The facepiece, in two sizes with adjustable wire nose spring and adjustable elastic headband, is adaptable to all face sizes.

DAILY REMINDERS

Such as Willson "Blind Man" Safety Posters keep workers aware of the need for wearing goggles. Supplies available on request.

WILLSON

"Established 1870"

WILLSON PRODUCTS, INC., 223 WASHINGTON STREET, READING, PENNA.

INDUSTRIAL NOTES, cont. . .

cago will serve the state of Illinois and northeast section of Indiana. Process Industries Engineers, Inc. of Pittsburgh will serve the Pittsburgh area and West Virginia.

J. B. Gill Co. has consolidated its Los Angeles engineering offices with its executive offices at 2901 Orange Ave., Long Beach, Calif.

Utilities Electrical Machinery Corp., Cleveland, Ohio, has changed its name to Utilities Machinery Corp. and moved to the National City-East Sixth Bldg. in Cleveland.

Metal & Thermit Corp., New York, has added temperature-indicating products to the lines of welding accessories distributed by them.

Abbott Laboratories, North Chicago, Ill., has sent by plane to Switzerland the first commercially processed shipment of radioactive isotopes to be sent abroad by a pharmaceutical house in the United States.

Box Board Corp. has opened a new $1,000,000 plant at Austell, Ga., for reclamation of waste paper into 150,000 lb. of paper box board daily. The new plant is located on a 48-acre site within the city limits.

Chas. Pfizer & Co., Inc., Brooklyn, N. Y., has formed a food, beverage and feed sales division with J. J. Thompson as manager.

Burrell Technical Supply Co., Pittsburgh, Pa., has changed its name to the Burrell Corp.

Agricultural Chemicals Co., Phoenix, has completed a remodeling and expansion program at its plant for the manufacture of insecticides, weed killers, fertilizers and soil conditioners. New construction includes five 10,000-gal. storage tanks for liquid concentrates and an installation for making dust insecticides. The original factory building will be used for manufacture of liquid chemicals.

Valve Service Co., Inc., Willoughby, Ohio, has started operations, specializing in the reconditioning of globe, safety and regulating valves, principally for large oil and chemical industries. Full-scale production is expected within 3 months.

Cambridge Wire Cloth Co. has erected an additional bay at its home plant in Cambridge, Md. The

(Continued)

REEVES Variable Speed Transmission

Above: Accurately controls baking time of bread in direct gas-fired tunnel oven.

Above: Maintains constant tension, reduces stretch of yarn on slasher in textile mill.

Above: Regulates speed of rotary table on welding positioner, for continuous weld.

Left: Provides infinite speed adjustability on lumber planer and matcher.

Above: Varies speed as required in filter processing of synthetic rubber.

Provides infinite, accurate speed flexibility within 2:1 to 16:1 ratio

Proved in thousands of installations in scores of industries, REEVES Variable Speed Transmission is the original compact and mechanically correct unit which drives production machines at infinitely variable speeds—making available instantly the most efficient speed for each different operation. It covers the entire speed range smoothly, without steps and without interrupting production . . . maintains any desired speed without fluctuation. Available in sizes fractional to 87 hp, both horizontal (illustrated) and vertical types, either open or enclosed designs. Choice of manual (handwheel), electric remote (push button) or entirely automatic controls.

Also in the complete line of REEVES Speed Control equipment are two other basic units—the Motodrive and the Vari-Speed Motor Pulley—likewise offered in the widest selection of designs, sizes, speed ratios and controls.

By providing the right speed for every job, under every changing condition, REEVES Speed Drives are assuring better quality products, higher rates of production and lower manufacturing costs in more than 260,000 widely diversified industrial installations and as standard equipment on more than 2,100 different makes of machines.

A REEVES engineer experienced in your field will be glad to consult with you. For information on the entire REEVES line, write today for the comprehensive 114-page catalog CE6-N.

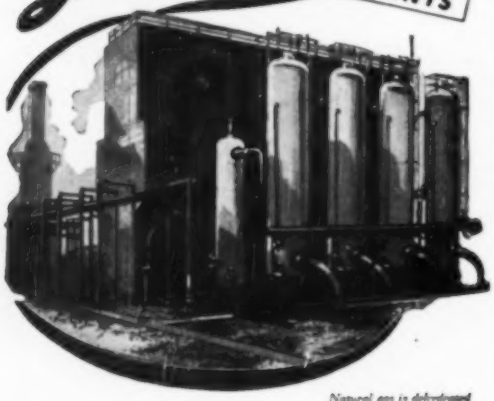
REEVES PULLEY COMPANY • COLUMBUS, INDIANA

Recognized Leader in the Specialized Field of Speed Control Engineering

ACCURATE • VARIABLE
Reeves Speed Control
GIVES THE RIGHT SPEED FOR EVERY JOB!

Floridin

ADSORBENTS



Natural gas is dehydrated by use of a Floridin product in this modern plant of an important company operating in the Southwest.

The Good Earth

Florida Fullers Earth
Activated Bauxite

acts many parts

Adsorbent	Filter Aid	Drying Agent
Bleaching Agent	Catalyst	Filler
Colloidal Gel	Catalyst Carrier	Suspension Builder
Flocculant	Catalyst Binder	

in many uses

Oil Refining	Pipe Line Drying
Desulfurization	Polymerization
Dehydrogenation	Treatment of Waste
Solvent Reclamation	Selective Catalysis

Water Treatment
Formulation of Insecticides and Fungicides

Ask for Floridin bulletins.....
File them for ready reference

FLORIDIN COMPANY
ADSORBENTS
Department A, 220 Liberty St. Warren, Pa.

INDUSTRIAL NOTES, *cont. . .*

18,000 sq. ft. addition was built especially to house the wire fabrication department.

Detrex Corp., Detroit, has created a process engineering department to be headed by George W. Pew. The department will investigate and make recommendations on operating methods and fabricating processes.

Michigan Chemical Corp., St. Louis, Mich., has appointed the Philip J. LoBue Co. as its New York representative for the domestic sale in the East of organic and inorganic bromides, pharmaceutical and industrial chemicals and insecticides.

Magna Manufacturing Co., Inc., has removed its New York executive and sales office to its plant at Haskell, N. J.

Beaumont Birch Co., Philadelphia, manufacturers of bulk materials handling equipment, has appointed R. K. Hampton resident manager of its new office at 50 Church St., New York.

Texas Gas Transmission Corp., Houston, has opened a Shreveport, La., office headed by W. L. Stanton.

Ferro Chemical Corp., Bedford, Ohio, has appointed Joe Copps sales agent for the state of Wisconsin for its products—metallic soaps, driers, fungicides and stabilizers.

Amertool Services, Inc. has been organized in Cincinnati by eleven tool manufacturing concerns to promote sales in the Latin-American market.

Enjay Co., Inc., New York, has opened a rubbers and plastics sales office in Elizabeth, N. J., headed by E. N. Cunningham.

Babcock & Wilcox Tube Co., Beaver Falls, Pa., has opened a district sales office at 250 Boylston St., Boston. It will be supervised by J. W. Bramley.

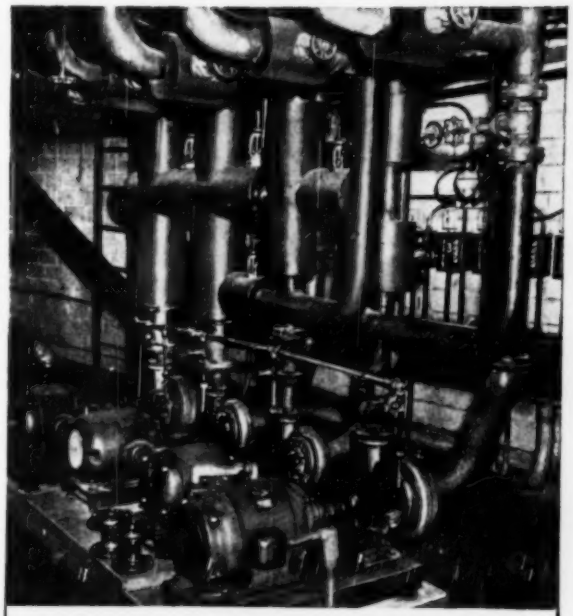
Witco Chemical Co., Akron, has transferred several carbon black producing units of its subsidiary, Continental Carbon Co., from Sunray, Tex., to Eunice, N. M.

M. W. Kellogg Co., New York, has made new laboratory facilities for chemical and physical research for the U. S. Atomic Energy Commission available to its subsidiary,

(Continued)

Whether corrosives are

SEVERE or MILD



Worthington Worthite Type CG Transfer Pumps on distillery slop evaporators at Brown-Forman Distillers Corp., Louisville, Ky. Besides handling the stillage, which is corrosive, these pumps also circulate mild muriatic acid and boiling caustic solutions for weekly cleaning of the evaporator. Worthite Pumps are unaffected by any of these corrosive solutions, and repairs are nil.

WORTHINGTON WORTHITE PUMPS HANDLE THEM AT LOWEST COST PER YEAR OF SERVICE

For fifteen years Worthington Worthite Pumps have been demonstrating their ability to handle both weak and strong acids and alkalis at lowest cost. Today, for mildly corrosive applications — including distilled water — the economy of using Worthite Super-Stainless Alloy Pumps in place of all-iron, bronze and ordinary stainless alloy pumps is a matter of record. That's entirely logical, because:

Worthington Worthite Pumps are designed to give best results with corrosive fluids of ALL strengths. Their exceptional resistance to corrosion and abrasion means very much longer life. Trouble-free operation reduces maintenance expense to rock-bottom. Volume production, with integrated designs and maximum interchangeability of parts, assures the best available materials at relatively lowest unit costs.

Whether your applications are mild or severe, put these advantages to work for you — and cut the costs of corrosion! Worthington Worthite Pumps are built in standard sizes, from 1 to 20,000 gpm. For further proof that *there's more worth in Worthington*, call our nearest District Office Or write to *Worthington Pump and Machinery Corporation, Centrifugal Pump Division, Harrison, N. J.*

WORTHINGTON

C9-4

THE WORLD'S BROADEST LINE ASSURES YOU THE RIGHT PUMP FOR EVERY JOB

Types CG and CGL. Sizes ¾" to 10". Capacities to 5000 GPM; heads to 300 ft. Liquid ends of WORTHITE alloy.

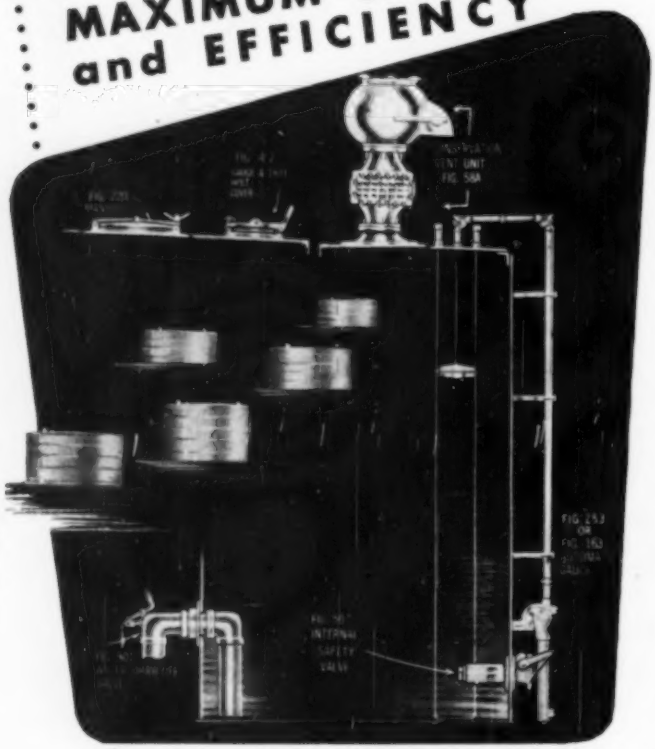
Type CF. Sizes 1" to 4". Capacities to 1000 GPM; heads to 130 ft. Standard, all iron and all bronze.

Type CG. Sizes 1½" to 3". Capacities to 600 GPM; heads to 130 ft. at 1750 RPM. Closed impeller. WORTHITE shaft and fittings.

Type L. Sizes 3" to 8". Capacities to 2250 GPM; heads to 300 ft. Single stage volute. For general service.

DESIGN YOUR LIQUID STORAGE FOR

MAXIMUM SAFETY and EFFICIENCY



USE "VAREC"
PROVED & APPROVED
TANK EQUIPMENT

Will you be planning additional storage facilities for your liquid products? If so, you'll want your tank builders to meet strict requirements for all your tanks, but you can make doubly sure of safe and efficient storage by including "VAREC" equipment in your plans.

There are "VAREC" Tank equipment and Safety Devices for all types of tanks . . . and for all types of storage problems. Your file copy of the "VAREC" P-7 Catalog has full details.

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Kellex Corp. The laboratories are located in Jersey City, N. J.

International Minerals and Chemical Corp. plans construction of an addition to its Greenville, Tenn., plant.

Worthington Pump and Machinery Corp., Harrison, N. J., has elected John J. Summersby vice president in charge of sales. Thomas J. Kehane was made assistant vice president and general sales manager.

Isolantite Mfg. Corp., formerly of Warren St., Lyndhurst, N. J., has moved to its new plant in Stirling, N. J.

General American Transportation Corp., Chicago, has appointed Ben King Duffy as its representative to handle plate and welding and process equipment division sales in its Pittsburgh district.

Filtration Engineers Inc., Newark, N. J., has formed a filtration fabrics division which will operate independently of the main company.

Sylvania Electric Products Inc., Towanda, Pa., has begun construction of a plant addition for its tungsten and chemical division.

Hudson-Edwards Mfg. Co., Macon, Ga., has changed its name to Edwards Products Co.

Clarostat Mfg. Co., Inc., has moved from Brooklyn to Dover, N. H.

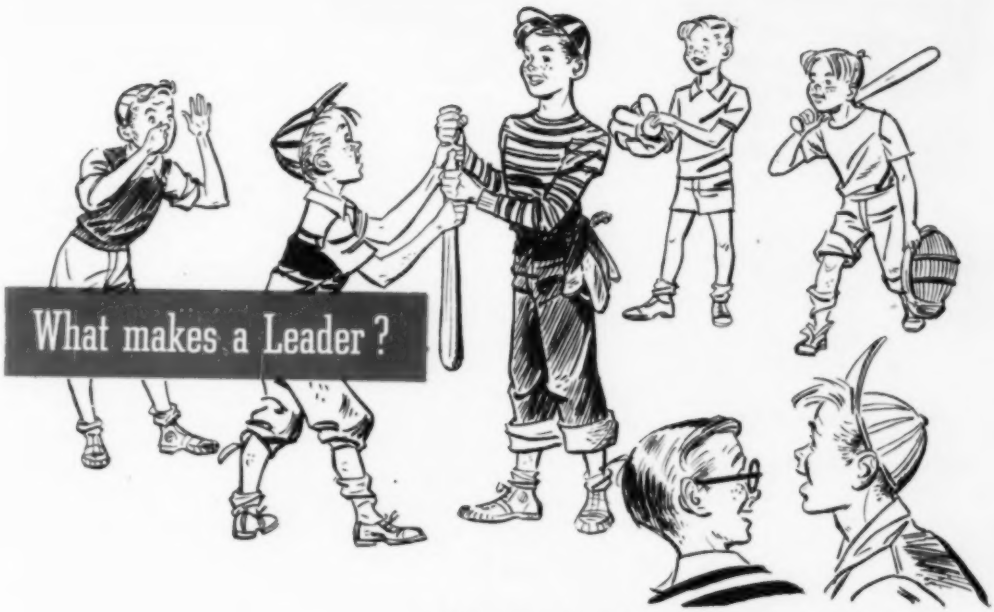
Pennsylvania Salt Mfg. Co., Philadelphia, has named Cecil B. Roberts product supervisor of its B-K division in the southwestern United States.

Hilton-Davis, Cincinnati, has appointed Blackman and Uhler Co., Spartanburg, S. C., to be its representative in the southern textile field.

Spectrochemical Laboratories, Inc., Pittsburgh, Pa., has been opened to offer spectographic and wet chemical analysis service to the chemical process industries.

Institute of Textile Technology, Charlottesville, Va., has reelected Roger Milliken chairman of the board.

U. S. Public Health Service is setting up at Salt Lake City, Utah, the first industrial hygiene field station west of the Mississippi. —*End*



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OIL

. . . *Needless Conservation*

D. P. Clark

All of us oppose waste. Indeed the oil industry has made such conspicuous progress in eliminating waste that the modern refinery is sometimes said to use all of the crude oil but the smell. Some misled conservationists, however, claim that by non-utilization and hoarding our resources in oil, we can avoid scarcity in the future.

The lesson of history is that nations, and America in particular, have become strong by using and developing their national resources—not by hoarding them. Such hoarding represents a delusion, for resources not developed in peacetime, will not be ready in time of war.

Some suggest that we avoid using high octane gasolines, and stop wasting our substance by building large automobiles that make driving a pleasure. Suppose we had done this. Imagine that the oil, steel, and rubber industries had not developed their plants to supply automobiles of the size and performance the public desired. We would never have had the volume and superiority of mechanized equipment that powered our drive to victory.

This conservation drive has been going since 1923. At that time we had reserves of seven or eight billion barrels, and were consuming at the rate of about 700 million barrels a year. Simple arithmetic showed that in 11 years the oil industry would be all washed up—if we did not conserve. Luckily, this defeatist counsel was not followed. For today, although producing at the highest rate in history—over two billion barrels a year—our oil men have developed history's greatest domestic reserves of some 23 billion barrels. During the course of this development, our automotive, airplane and mechanized equipment industries have built the world's greatest manufacturing organization. Refusal of the doctrine of scarcity created more plenty than even the oil men once dreamed of.

Today, our industry has extended its search for oil over oceans and most of the inaccessible regions of the world. At the same time, other scientists are advancing the development of synthetic fuels, atomic power and other sources of energy. Putting our faith in these modern pioneers, rather than in the apostles of scarcity, gives us the key to America's future.

D. P. Clark, Gulf Oil Corp., before American Petroleum Institute, St. Louis, May 10, 1949.

ATOMIC POWER

. . . *Instrumentation*

D. Cochran and C. A. Hansen, Jr.

The atomic power plant now being constructed for the Atomic Energy Commission at the Knolls Atomic Power Laboratory in Schenectady will probably be the first to generate useful electric power in more than token amounts. This is an experimental plant whose purpose is to investigate power production on a practical scale and breeding the simultaneous production of new nuclear fuel at a rate greater than the fuel consumption. This plant employs liquid metal reactor coolant and steam turbo-electric power generation equipment.

The reactor is an assembly consisting of jacketed nuclear fuel elements, control elements, moderating material, and reflecting material. The liquid metal coolant is pumped through channels in the reactor core where it receives heat from the fuel elements. Leaving the reactor, the coolant passes through heat exchangers where it gives up heat to evaporate and superheat steam. The steam drives a turbine to generate electric power.

The heat generating nuclear reaction causes tremendous radioactivity which must be confined by an absorbing shield. The liquid metal coolant

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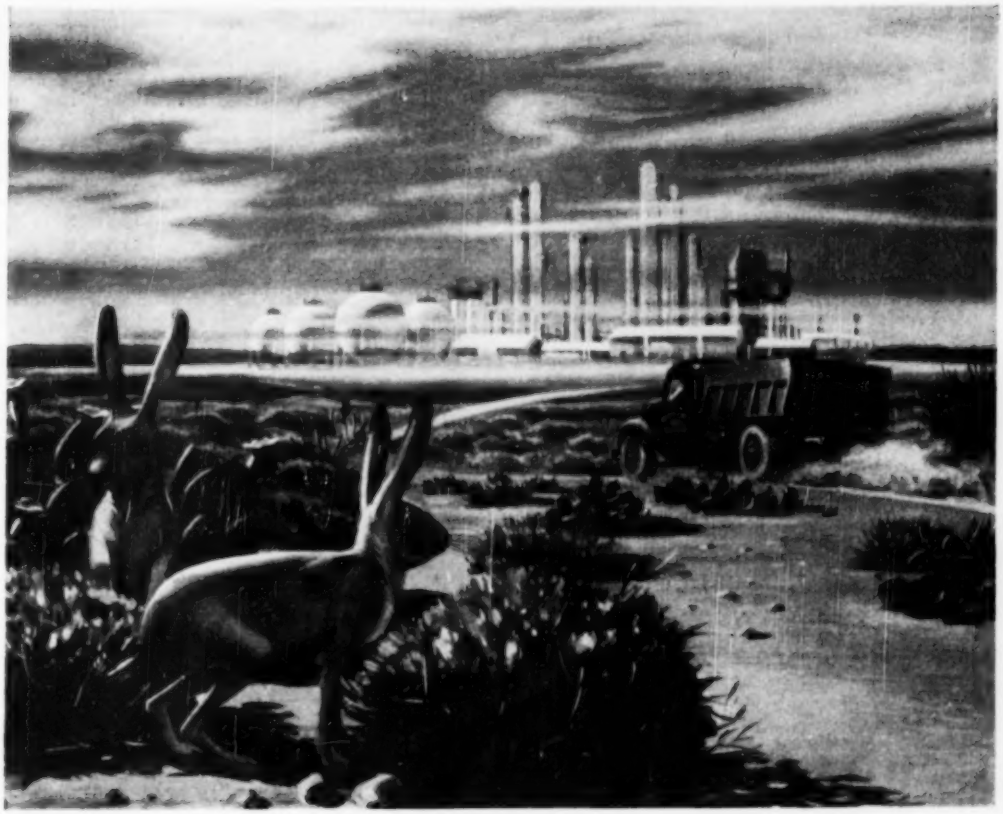

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CONVENTION PAPERS, cont. . .

passing through the reactor core becomes radioactive because of its exposure to neutron flux. Thus, the piping, pumps, heat exchangers and storage tanks which carry the coolant must be shielded. It is unnecessary to shield the steam and water piping because the radioactivity of the coolant does not cause radioactivity in the water.

Very low vapor pressures are possible in the liquid metal system, but it is necessary to maintain a blanket of inert gas over free surfaces of liquid metal to prevent oxidation.

The chief problems involved have included the selection of adequate instruments and detection devices. The particular difficulty arises from the radioactivity of the reactor and coolant, and the shielding surrounding them. As a result, instruments must have extreme dependability. Ordinary power plants have safety valves which can dissipate extra energy should the system suddenly produce a surge of energy. The nuclear reactor has limited capacity for absorbing extra energy, so there must never be a runaway condition in the plant. The instruments must be mounted so as to permit remote maintenance, since radioactivity prevents operators approaching the reactor. There must be absolute leak tightness, for even minute quantities of radioactive coolant may cause a serious hazard should they escape.

The biggest obstacle to the development is the lack of instrument testing facilities, there being few liquid metal systems, and fewer places where the effect of radiation on devices may be studied. Therefore, operation of the first plant may be hampered somewhat by inadequate instrumentation. There is opportunity here for many worthwhile contributions from instrument specialists to the development of useful atomic power.

D. Cochran and C. A. Hansen, Jr., General Electric Research Laboratory, before American Society of Mechanical Engineers, San Francisco, June 27-30, 1949.

TESTING

. . . *Permeance*

E. R. Queer & F. A. Joy

In determining the way a specific material, such as paint, paper or wood will affect humidity, the fundamental thing to know is how fast moisture can be transmitted through it. This rate of transmission is known as the "permeance" of the material.

Many devices have been used to

(Continued)

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hersey-dryers

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measure permeance, but at the Engineering Experiment Station at Pennsylvania State College a new method has been developed to overcome some of the limitations of former methods and provide a means for testing thicker materials.

This new method involves an apparatus in which the material being tested can be sealed between two cups, thus eliminating the need for humidity control of the surrounding atmosphere. Within one cup of the double-cup cell a pan of water is placed, and within the other a desiccant pan. Water from the water pan gradually enters the material being tested and passes through it to the desiccant pan.

Loss in weight of the water is the weight of moisture entering the specimen, and the gain in weight of the desiccant is the weight of moisture leaving the specimen. These two weights are equal when the apparatus is functioning properly and thus permit two separate determinations of the weight of the water vapor transmitted.

The water and desiccant pans can be weighed without removing them from their chambers. A means for determining vapor pressure in each chamber has been developed.

Permeance of a material tested with this apparatus depends upon the weight of the vapor transmitted, the time required for transmission, the area of the specimen, and the difference in vapor pressure in the two chambers.

E. R. Queer and F. A. Joy, Pennsylvania State College, before American Society of Heating and Ventilating Engineers, Minneapolis, June 22, 1949.

RESEARCH

. . . *A Rubber Institute*

Harry L. Fisher

Most of the research work in Europe has been done by university men, whereas in this country it has been done by industry. Very little, in fact had been done in universities until the Office of Rubber Director employed them in the synthetic rubber program in the war. Industry needs basic research work and gains much from it. Industry, by its very nature, however, finds it difficult to give research men free rein, because of the necessity of producing practical results. Short excursions into fundamental research are often planned by management, but research men usually have felt it necessary to "earn" their opportuni-

(*Continued*)

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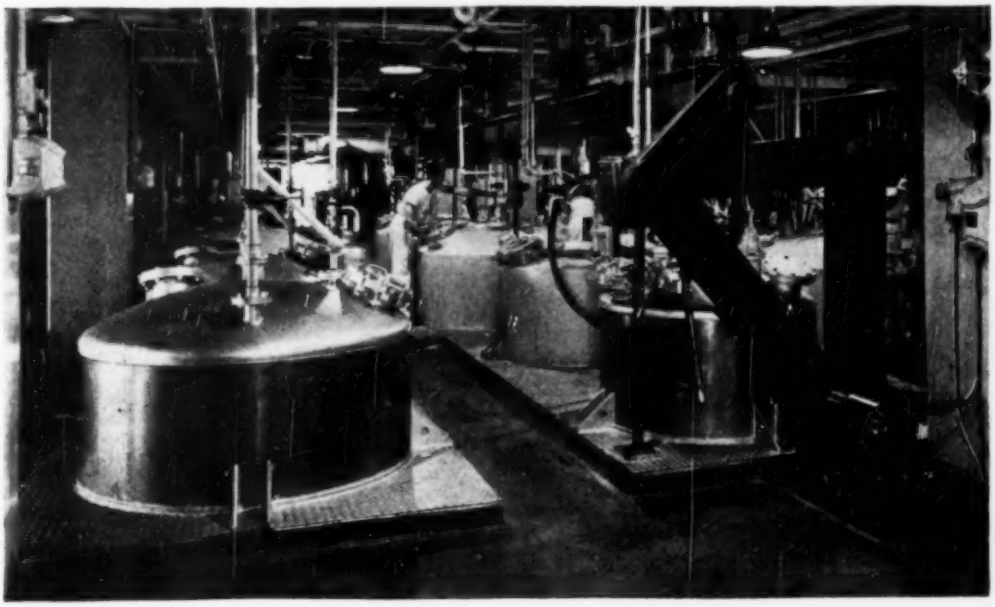

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ties to do basic research by periodically completing a practical problem. Although this method frequently leads to important results; as competition grows stronger, the big companies put more and more emphasis on applied research and development, allowing less time for basic investigations. Industry, however, is built on research—it is its life blood.

The rubber industry vitally needs some basic scientific study today, for the future of rubber depends on fundamental advances, rather than minor day-to-day improvements. Investment in science, without any thought of immediate return, is the only way to produce the revolutionary developments which are possible. Our country took the lead in research during the war; to continue that lead, we vitally need the establishment of a rubber research institute.

The idea for such an institution is not new. It has been voiced often, officially and unofficially. No one rubber company can afford to put a large percentage of its research efforts on a basic program from which profitable results seem so uncertain. Cooperation, therefore, is needed in a future program of fundamental research. Executives must face now the law of diminishing returns in research as conducted along present lines. A cooperative laboratory should be developed, present research brains of the country concentrated in it, and its location placed away from any present factory. The pooled support of even a portion of the rubber industry would make the burden on each corporation very slight. An ample appropriation, over a period of ten years might revolutionize the entire scope, quality and utility of the rubber industry.

Such an undertaking should have as its primary objective the conducting of long-term fundamental research and the stimulation of research elsewhere by cooperation with other organizations, by the dissemination of information, and by a campaign of education.

Companies, like individuals, have obligations to advance the fundamentals of their fields. A rubber research institute would help much toward doing this in our industry. Already, great strides along these lines have been taken by the cooperative development and research program of the Office of Rubber Reserve. Its program, however, is restricted to synthetic rubber. An all-industry institute could carry out research on all types of rubbers.

An institute of this sort could be

(*Continued*)

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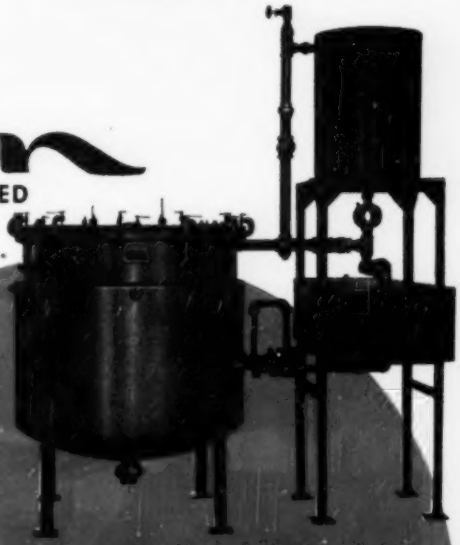
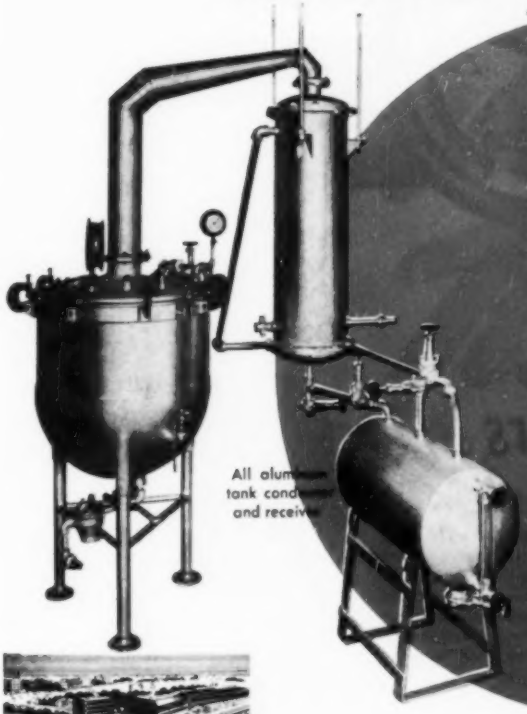


All steel wax recovery unit consisting of a jacketed tank with a spiral coil condenser and rectangular receiver.



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best sponsored and controlled by American manufacturers. When the importance of the work is realized, means will be found to set it up and maintain it. Since such a program would benefit the entire public, the government should contribute toward its support as it has done in similar cases in the past.

The present cost of the research and technological program of the Office of Rubber Reserve has been only about $500,000 a year. Since it is likely that the present government research program on synthetic rubber will be reduced considerably in the near future as the participation of industry is removed, the program could be continued by being allocated to the new research institute. The administration and responsibilty for all fundamental research on rubbers would then be in the hands of private industry with the government in a supporting rather than an initiating role.

Eventually the research institute should have its own building and equipment, but at the start it could operate at a university, preferably where there is much interest in polymerization and polymeric substances. Suggested locations are Cornell University, Princeton University, and the University of Illinois. It should take advantage of other university facilities wherever available.

Harry L. Fisher, U. S. Industrial Chemicals, Inc., before Division of Rubber Chemistry, American Chemical Society, Boston, May 25, 1949.

CHEMICAL WARFARE

. . . The Chemical Industry's Place

John J. Grebe

In the interest of averting another devastating war, the chemical industry of this country should put more effort into national defense.

The fields of present day ABC (Atomic-Biological-Chemical) warfare are as wide and as varied as those of our engineers, scientists, and industry itself. Their potentialities, even in the hands of small nations, are staggering. The important thing for us, as chemical engineers, to consider is our position in this field and how readiness in this type of warfare can aid in the prevention of hostilities.

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(Continued)

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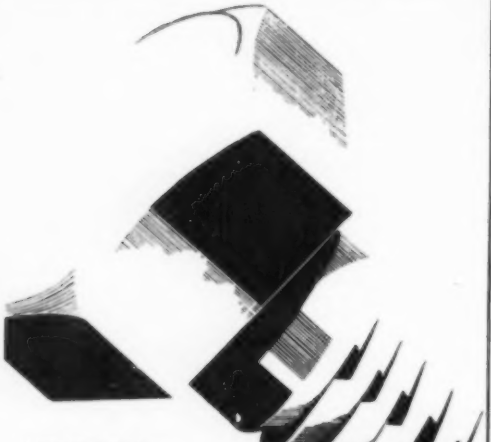

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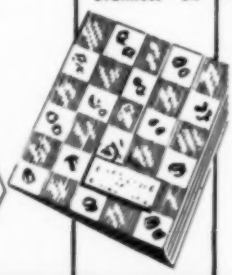

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making each nation less dependent on imports from possible enemies. Today's world wide capacity of this industry is sufficient to support the basic concepts of unfettered growth without resorting to war.

The growth of industrial potential in the U. S. has been in the exact direction of producing the basic chemicals and equipment that could be converted for national defense. But while progress in chemical warfare research in this country is good, we are farther from our goal in this field than in any other military activity. There is nothing I can recommend more highly than that a succession of men cut into their professional careers to work for the National Defense Agencies. There is no place where the best of our new graduates can work with more satisfaction and responsibility than with this organization that has been able to do so much with so little in the past.

John J. Grebe, Chief Technical Advisor to the Army Chemical Corps, before the Chemical Engineers Club of Washington, D. C., May 16, 1949.

PETROLEUM

. . . *Formed by Bacteria*

Claude E. ZoBell

There are almost as many theories on the origin of oil as there are students of the subject. Most authorities, however, agree that petroleum was formed from the organic remains of plants and/or animals. It is axiomatic then, that bacteria have contributed to the process, since all bodies are susceptible to bacterial attack after death.

Living bacteria have been shown to be widely and abundantly distributed in marine sediments where oil is believed to have been formed. These bacteria will tolerate the environmental conditions characteristic of petroliferous sediments. Methane, a common constituent of natural gas and crude oil, is produced during the anaerobic fermentation of many different organic compounds. A number of other hydrocarbons are known to be produced by bacterial action too.

Bacteria may contribute to petroleum formation either by production or by utilization of molecular hydrogen converting methane into higher hydrocarbons. Another of their functions is to lower the redox potential of sedimentary deposits.

Test tube experiments have demonstrated that bacteria may release oil and promote its flow in several ways. The activity, presence, and products

(Continued)

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of bacteria which oxidize volatile hydrocarbons in soil overlaying subterranean deposits of petroleum may serve as indicators in geomicrobiological prospecting.

Besides finding applications in the fields of petroleum and chemical technology, the results of research on bacteria as biochemical and geochemical agents are yielding fundamental information on bacterial physiology.

Claude E. Zobell, Scripps Institution of Oceanography, before Southern California Section, American Chemical Society, May 6, 1949.

WAX

. . . American Montan

W. H. Ode & W. A. Selvig

Before World War II montan wax requirements for United States industry were met by imports, nearly all of which came from Germany. In 1939, more than 7 million pounds were brought into the United States and incorporated in polishes, electrical insulating compositions, leather dressings, inks, carbon papers, protective coatings, greases, and other products.

When the imports were shut off at the beginning of the war, American industry was forced to rely on substitutes which did not possess all the desirable properties of montan wax.

Some of this valuable wax has been obtained from domestic coals in Arkansas and California and a little still trickles into the country from Czechoslovakia, but a recent investigation conducted by the Bureau of Mines reveals that domestic sources could be exploited to supply tremendous quantities of highgrade montan wax.

Forty-four samples of lignite from mines, outcrops, and drill holes were examined from Arkansas, California, Montana, North Dakota, Texas, and Washington. Although the survey was confined largely to lignitic coals, subbituminous coals from Colorado, Montana, Oregon, and Wyoming were examined for comparison with extraction yields of coals of lignitic rank.

Some of the yields from Arkansas and California lignites compare favorably with those from the brown coals of central Germany, but it is probable that the lignites from Montana, North Dakota, Texas, and Washington do not contain enough montan wax to make the processing worthwhile.

Although the solvent used by the Germans is believed to be a mixture of benzene and ethyl alcohol, the

(Continued)

Streptomycin Plant —
Merck & Company, Elkton, Virginia

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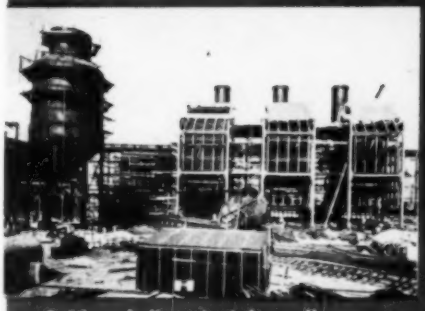
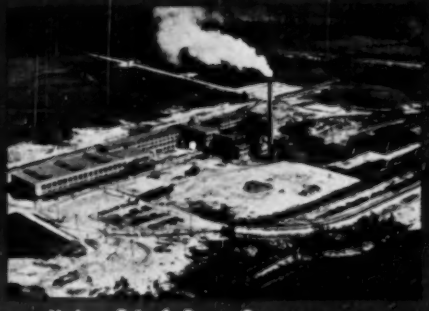


Outdoor boiler plant for refinery —
The Texas Company, Port Arthur, Texas



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From its extensive experience in industrial and heavy construction, the personnel of the Industrial & Building Division of Merritt-Chapman & Scott Corporation has developed the facilities, the capacity, and the resourcefulness to meet the challenge of time and cost.

Whatever your task, whether it be the construction of a chemical plant, a refinery, a pulp and paper mill (Merritt-Chapman & Scott Corporation has completed $60 million worth of paper mill work alone!), a new drug manufacturing plant, a steel mill, a boiler plant, or the installation of new equipment, the resources, experience and personnel of Merritt-Chapman & Scott Corporation are at your disposal to speed its construction.

This capacity for accomplishment is as near as your telephone whenever and wherever you have a construction job you want well and economically handled.

Your Confidence is Justified

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EFFECTIVE LUBRICATION AT MOST ANY TEMPERATURE
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The fact that LUBRIPLATE Lubricants are able to meet extreme temperature conditions, demonstrates the ability of these products to cope with the wide variations found in everyday industry. Besides this feature LUBRIPLATE Lubricants possess attributes not found in conventional lubricants.
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Bureau of Mines found that using benzene alone produced a grade of montan wax more nearly like the imported product.

The most significant difference between the waxes obtained from American lignites in this investigation and the Riebeck brand of wax from Germany was the greater resin content of the waxes from domestic sources. In this respect they resembled more a commercial grade of montan wax imported from Czechoslovakia.

The benzene-alcohol extractable waxes had a higher content of asphaltic material than the benzene extracts. If required, the resins and asphaltic materials could probably be removed from the crude wax by suitable solvent refinement.

W. H. Ode and W. A. Selvig, U. S. Bureau of Mines, before Division of Gas and Fuel Chemistry, American Chemical Society, Pittsburgh, May 9, 1949.

INTERNATIONAL

. . . *Russian Science*

David E. Lilienthal

In Russia domination by politicians and their ideas and fears is complete. It covers the waterfront: politicians rule the minds of scientists and engineers, the writers and publishers of books, the producers of motion pictures, and of music and of poetry, as well as of education and teachers.

We do not have to guess how tragic a set-back individualism would suffer in America under political and bureaucratic domination of the free spirit of scientific inquiry. The Russian daily newspapers and magazines supply all the demonstration—and warning—one needs.

The theme of the official Russian science seems to be that an idea that originated in the mind of a non-Russian and a non-believer in Communism is scientifically wrong.

Nuclear physics is one of the most recent fields for investigation. Take the case of a prominent atomic scientist, (you can read this sad story in the Russian publication *Literary Gazette* for November 20 1948). He is Associate Academician Y. I. Frenkel, Stalin prize winner in 1947, member of the Leningrad Physical and Technical Institute. He is now way back in the Russian dog-house, for the Russian politicos found he favored a theory of the atom and the electron that happens to be well accepted in this and other Western democratic countries. But that wasn't the whole of his crime. In his file

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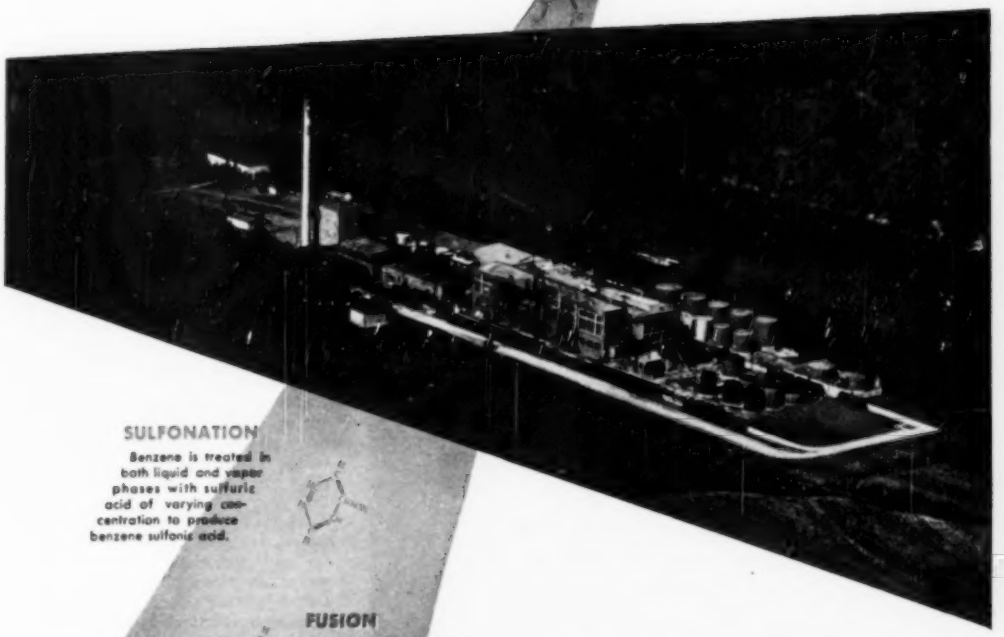
SYNTHETIC PHENOL

plants designed, engineered, and erected by
Foster Wheeler



SULFONATION

Benzene is treated in both liquid and vapor phases with sulfuric acid of varying concentration to produce benzene sulfonic acid.

FUSION

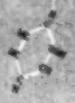
The intermediate organic acid is treated with caustic soda to produce sodium phenate and sodium sulfite.

ACIDIFICATION

Sodium phenate is treated to produce phenol and sodium sulfate.

DISTILLATION

Commercially pure phenol is produced from crude stock



The plant shown above is one of the largest producers of synthetic phenol in the country. Although this particular plant is capable of producing upwards of 20,000,000 lb of phenol yearly, Foster Wheeler has also designed a new low capacity synthetic phenol plant with a yield of approximately 3,000,000 lb per year. The process is relatively simple, and yields one lb of phenol per lb of benzene feed stock. Sulfonation by-products are sodium sulfate and sodium sulfite in anhydrous form.

FOSTER WHEELER CORPORATION
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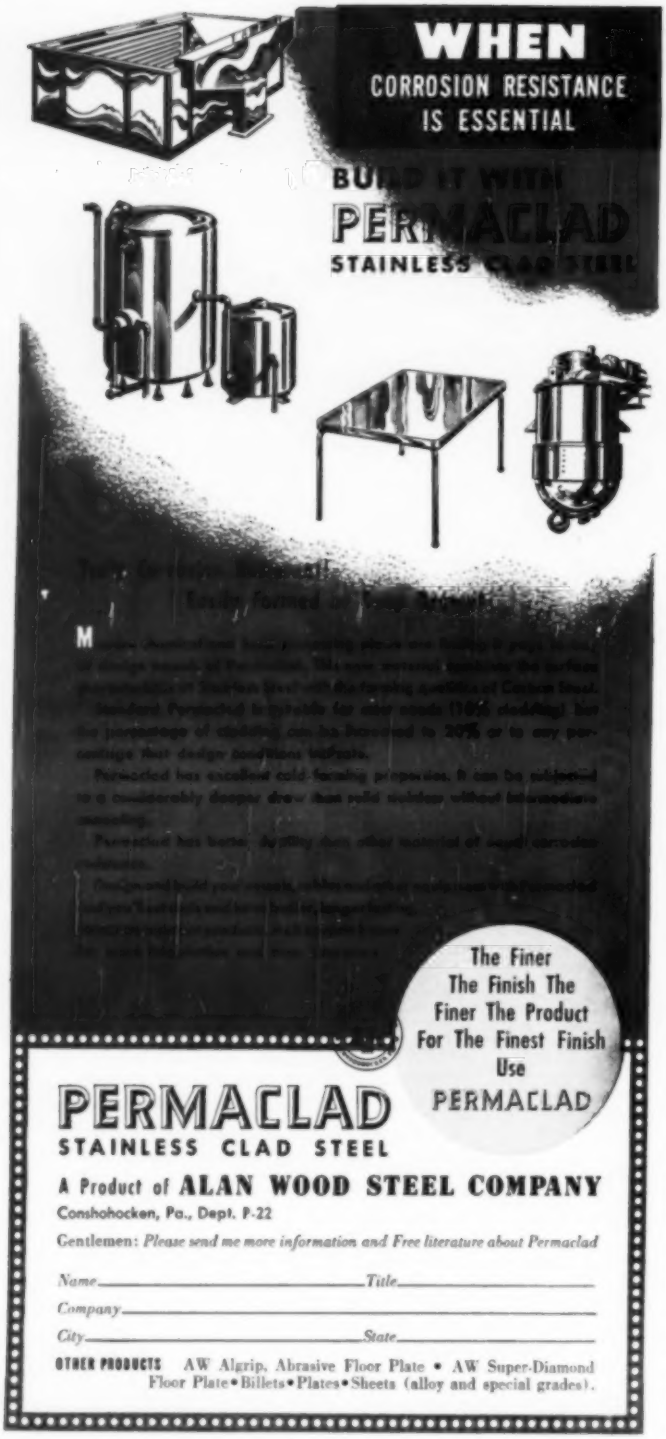
FOSTER WHEELER



it was discovered that this hapless scientist was a member of the American Physical Society and the National Geographic Society of the United States. This "guilt by association" probably finished the cooking of his goose.

David E. Lilienthal, U. S. Atomic Energy Commission, before American Booksellers Association, Washington, May 18, 1949.

OXYGEN

. . . *Current Status*

C. C. Wright

Recent modifications and refinements in the cold accumulator principle, developed by Frankl some 15 years ago, have now made the manufacture of "cheap" tonnage oxygen an accomplished fact.

The main product of the process is gaseous oxygent of purity ranging from 90 to 95 percent. In certain cases, nitrogen ranging from 95 to 96 percent purity may be desired as a byproduct.

Cost of tonnage oxygen is dependent upon a number of factors which make generalized statements of little value. Many published reports say plant size is an important factor with unit cost of oxygen increasing 100 percent or more going from a 500-ton-per-day plant down to a 50-ton-per-day operation. However the probability of operating at lower load factors has led several manufacturers to suggest 500 tons as an economic size limit.

The two major cost items in tonnage oxygen production are power consumption and fixed charges. Both vary greatly depending upon equipment used and the quality of the product required. Moreover, in the final analysis of oxygen cost, reported figures are based upon a substantially 100 percent load factor. As this drops the cost of the oxygen, of course, goes up.

A number of tonnage oxygen plants ranging from a 10 ton pilot plant to a 2,000 ton commercial installation are now under construction or in operation. One commercial plant has been in operation in this country for several months and four pilot plants for periods ranging from over a year to a few months. Five other commercial plants are in various stages of completion, and several manufacturers are now in position to design, engineer and erect tonnage oxygen plants of any size to meet the customer's requirements.

(Continued)

It's the Nash!

Nash Compressors in your plant can automatically increase the capacity of your absorption equipment, for with the Nash it is possible to secure absorption directly in the pump.

This is due to the Nash liquid compressant operating principle, involving a fluid vortex through which the gas must pass in the process of compression. To absorb from a gas, simply flow absorbent through the compressor as the compressing medium. In this close contact of liquid and gas, the desired fractions are picked up and retained by the absorbent. This in no way impairs efficiency as a compressor.

This useful stunt is made possible by the fact that slugs of liquid entering a Nash Compressor do no harm to the pump structure. Nash pumps have only one internal moving part, simple, non-wearing, and employ no gas contaminating internal lubrication. There are no valves, gears, pistons, or sliding vanes, and original pump efficiency is maintained over a long life. In a single stage Nash Compressors produce 75 lbs. pressure or vacuums to 26 in. of mercury, with capacities up to 6 million cubic feet per day in a single structure. Investigate these pumps now.

One moving part.

No internal wearing parts.

No valves, pistons, or sliding vanes.

No internal lubrication.

Low maintenance.

Slugs of liquid entering pump do no harm.

Original performance constant over a long pump life.

Non-pulsating pressure.

Saves floor space.

75 pounds in a single stage.

NASH ENGINEERING COMPANY

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Multi-Metal's complete reconditioning service makes old filter units perform like new. Filter Leaves for standard equipment are stocked for immediate shipment. Special units can be made promptly to your exact specifications.

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Write for catalog and free wire cloth samples.

More than 35 years of service to process industries

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Capital and operating costs have now been reasonably well established and will be found to vary considerably with local conditions and requirements. However a figure of $4 or $5 per ton is not unreasonable for a plant of about 250 tons per day, assuming 100 percent load factor.

C. C. Wright, Pennsylvania State College, before American Gas Association Technical Section, Joint Production and Chemical Committee Conference, New York, May 24, 1949.

RUBBER

. . . New Neoprene

L. R. Mayo

Neoprene was the first commercial general-purpose synthetic rubber developed anywhere in the world. This elastomer was developed in the laboratories of the Du Pont company, and was first announced in 1931. Production began the following year.

Because neoprene compositions resist oils, grease, chemicals, heat, and sunlight much better than those of natural rubber, this chemical rubber has been successfully applied to such uses as gasoline hose, oil and air hose, conveyor and transmission belts, insulated wire and cable, hospital sheeting, gloves, automotive parts, and numerous other applications where durability under severe service conditions is a paramount requirement.

Like natural rubber, neoprene tends to crystallize at moderately low temperatures. Crystallization effects are sometimes advantageous and at other times undesirable. On the desirable side, crystallization makes it possible for manufacturers to produce high-tensile-strength rubber from gum-type stocks, and a special, fast-crystallizing type of neoprene is used in preparing exceptionally quick-setting adhesives. On the other hand, crystallization results in stiffening at low temperatures which is undesirable in such products as oil and air hose, coated fabrics, and in motor mounts for washing machines and other appliances.

Improved resilience in neoprene compositions at low temperatures can be achieved by the addition of small amounts of various compounding ingredients capable of physically interfering with the process of crystallization. Certain polymerized hydrocarbons, derived from either petroleum or coal tar, were found to be the most effective agents of this type. There are, however, very definite limitations to the results which can be obtained by the use of compounding ingredients.

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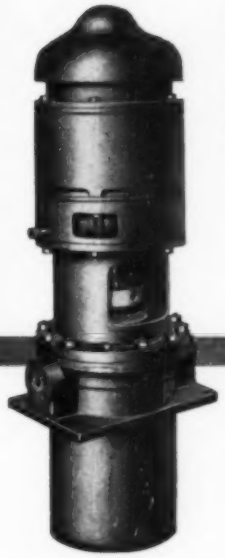
For High-Pressure Applications in Refineries and Industrial Processes



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Ingersoll-Rand Class VP Pumps are vertical, multi-stage, diffusor-type units with single-suction impellers. They are made with 3, 4, 5 or 6 stages, depending on the operating conditions for which the pump will be used. Capacities range from 10 to 400 gpm . . . pressure to 750 psi.

They're easy to maintain because —

- The inner assembly can be pulled directly out of the casing without disturbing the discharge and suction piping
- There is only one stuffing box—and it is under suction pressure
- Bearings are lubricated by the liquid being pumped—No external lubrication piping
- Fewer spare parts—all the impellers and diffusors are interchangeable

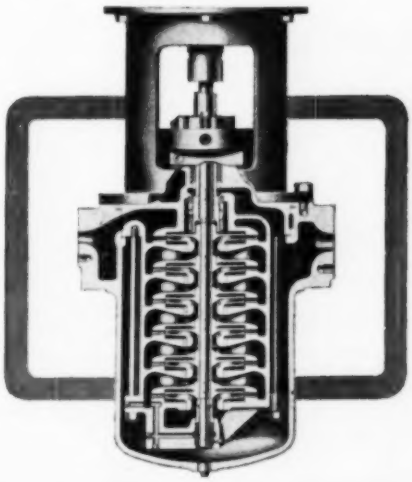
They provide better operation because —

- Diffusor-type construction eliminates radial thrust
- The first-stage impeller is located on the bottom—Extra NPSH is therefore obtained
- High pressure breakdown above the last stage impeller balances pump thrust

An Ingersoll-Rand engineer will be glad to tell you more about Class VP Pumps. Ask for your copy of Form 7145-A.

They're easy to install because —

- No bedplate or grouting is required
- A minimum of floor space is needed—only 4 sq. ft. for the largest unit
- Simplified, straight through piping—no loops —no elbows



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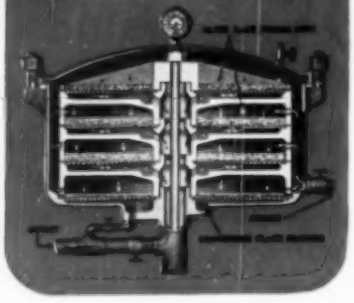
why Horizontal Filter Plates?



because—with horizontal plates, filter aids are permitted to flow in a natural direction, with gravity, and are deposited in an even cake of uniform thickness.

because—the filter cake rests flat on the supporting plate without tensile or distortive strain, will not crack, slip, or break under pressure, assuring even filtration.

because—any filter paper, cloth, screens, or filter media can be used. Strength in the cake itself is not important, pressure simply presses the cake more firmly on the supporting horizontal plate.

because—horizontal plates are bolted together in a unit that is easily removed for cleaning. An extra unit assembly of horizontal plates can be immediately placed in the filter and the filtering process continued with slight interruption.

This is only part of the story—other exclusive features like the patented scavenger plate that makes possible the recovery of the last of a batch run and other operating advantages are reasons why Sparkler Horizontal Plate Filters are so widely used in the chemical processing industry.

SPARKLER *horizontal plate* **FILTERS**

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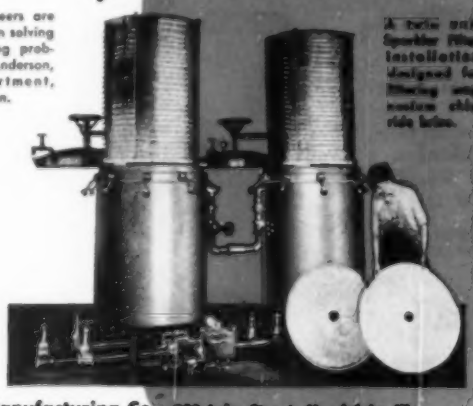


SPARKLER Manufacturing Co., 350 Lake Street, Mundelein, Ill.

It was with the thought that a wholly new type of neoprene might be developed which would have superior resistance to crystallization, and yet retain the good qualities of crystallizable elastomers, that research directed to this end was begun in Du Pont laboratories. Result of this research was a product designated as Neoprene Type RT, which has all the virtues of general-purpose Neoprene Type GN, yet displays a high degree of flexibility at low temperatures.

General-purpose neoprene is made by the polymerization of chlorobutadiene. This new type of neoprene is an interpolymer of chlorobutadiene and styrene. Styrene, of which only a small quantity is used, is believed to inhibit crystallization by breaking up or preventing the orderly arrangement of the elastomer molecules necessary for the formation of crystals.

It is anticipated that this new elastomer will extend the use of neoprene-type compositions to products where, in the past, crystallization effects have been a serious drawback.

L. R. Mayo, E. I. du Pont de Nemours & Co., before Division of Rubber Chemistry, American Chemical Society, Boston, May 25, 1949.

MANAGEMENT

. . . *Disposition of Earnings*

Irving S. Olds

If some members of Congress had their way, any dollar profit in excess of that earned in some arbitrary specified base period would be taken away to a considerable extent through additional taxes, regardless of whether current earnings are adequate or inadequate on the basis of a return on sales or a return on investment. Others would penalize the corporation financially if it does not regularly distribute two-thirds or more of its current earnings to stockholders in the form of dividends, and thus enable the government to increase its revenue by an unfair double tax upon these same earnings.

Some labor advocates would point to the fact that dollar profits are higher than they were a few years ago, and contend that the increased income belongs largely to labor, and that therefore wage rates or employee benefits should substantially be increased.

Some customers and others would allege that higher dollar profits are clear evidence of excessively high prices, and that prices should be cut.

When it comes to stockholders, some would be of the opinion that

(*Continued*)

They chose INCONEL *to guard the purity of life-saving* CHLOROMYCETIN

Interior of a 5000-gallon Inconel-Clad Steel Chloromycetin fermenter, made by National Annealing Box Company, Washington, Pa.

Chloromycetin . . . medicine's powerful weapon against the devastating typhoid and typhus-type diseases...is now in volume production at Parke, Davis and Company, Detroit.

This new crystalline antibiotic is derived from a soil mold, which throws off Chloromycetin to destroy foreign organisms encroaching upon its environment.

In the commercial production of Chloromycetin, mold cultures are brought to maturity in a series of Inconel* and Inconel-Clad Steel vessels. Harvesting from the final ferment is accomplished by a complex sequence of operations . . . filtration, concentration, extraction, vacuum distillation, decolorization, and crystallization.

Throughout every step of production, the delicate mold cultures must be rigorously protected from contamination . . . both for aseptic reasons and to secure the highest possible yield.

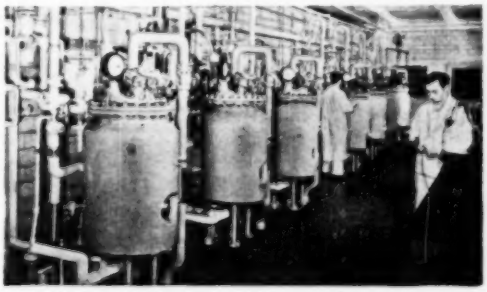
Inco's Corrosion Experts Help

Because of their long and satisfactory experience with Inconel in the production of other sensitive pharmaceuticals, Parke, Davis decided to investigate it for use in Chloromycetin processing. With the cooperation of Inco's Corrosion Engineering Section, tests were made . . . and Inconel's suitability was corroborated.

In use, the Inconel and Inconel-Clad Steel processing vessels have proved entirely satisfactory. Because of its high resistance to corrosion, Inconel is unaffected by nutrient solutions, acid washes, and solvents.

If you have problems involving corrosion or product contamination, consult Inco's Corrosion Engineering Service.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.



Seven 50-gallon pre-seed Chloromycetin fermenters. The vessels are solid Inconel, except for carbon steel flanges.

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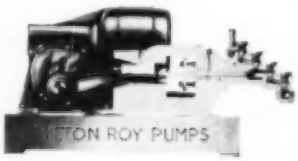
Milton Roy Pumps are available in standard Simplex and Duplex types, also in special "gang" units to handle up to 10 streams in exact ratio. Liquid ends are non-clogging and self-cleaning, in materials of construction, including plastics, for practically all corrosion resistant requirements.

Ask for Catalog 146.



MILTON Roy COMPANY
1322 E. MERMAID AVE., CHESTNUT HILL, PHILA. 18, PA.

the management is at fault because the profit of the corporation has not been higher in these recent days of a sellers' market. Other stockholders would say that their investments made possible these current earnings and that they are the ones entitled to share therein by receiving larger dividends. Members of this latter group would argue that they need cash today to pay present high living costs and that it is of no particular concern to them whether or not earnings are reinvested in the business so as to equip the corporation to help serve the needs of the nation some ten or twenty-five years hence.

All of these conflicting points of view cannot possibly be fully met. On the contrary, the directors, in the exercise of their composite best judgment, must decide what course of action is best for the corporation, all things considered. They have to bear in mind that the corporation is not a creature merely of the moment, but rather is a continuing enterprise of large potential importance to the nation. These determinations are an essential part of the directors' functions and cannot be avoided simply because some particular decision may not be welcome to one or more of the groups mentioned.

Irving S. Olds, U. S. Steel Corp., before Association of Stock Exchange Firms and Chamber of Commerce, Salt Lake City, May 27, 1949.

RUBBER

. . . *Cold Rubber Softening Problem Licked*

E. L. Stangor & R. R. Radcliff

Cold rubber can be softened for milling by the addition of 0.5 percent of an aromatic mercaptan.

Unless rubber has been properly softened, it is not possible to mold or extrude it in the form of tires or other products. The difficulties encountered in softening cold GR-S were so great as to constitute a formidable bar to general use of this admittedly superior synthetic.

After one part of the mercaptan is mixed with two hundred parts of cold GR-S, the exceptionally tough rubber can be broken down into a usable form by masticating it between steel rollers or in a Banbury. The milling process takes only a few minutes and is carried out at a temperature below 350 deg. F.

Although natural rubber is again available in quantity, nearly half a million tons of synthetic rubber are

(*Continued*)

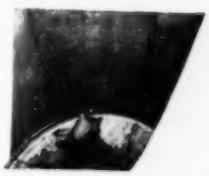
LEAD LININGS

...blunt the teeth of Hungry Acids

In unnumbered processing plants across the country, sheet lead plays a vital role in keeping acids under control. Because, among other unique properties given lead by nature, is *stern resistance to corrosion.*

It is this innate ability to blunt the teeth of hungry acids, coupled with several of lead's other "abilities"—adaptability, workability, durability and availability—that makes the use of lead a virtual "must" as a lining for tanks, tubs and vats in which corrosive liquids are handled, moved or stored.

National Lead markets sheet lead of several types—chemical, antimonial, tellurium and antimonial-tellurium. Each has its functional place in the processing field. All are produced with a know-how that makes the most of the metal's inherent qualities. From starting slab to sturdy sheet, the rolling is done under the watchful eyes of experienced operators. The sheet comes off the cutting table smooth, uniform, and true to weight and dimensional specifications.



If your acid-handling activities demand lead's unusual combination of properties, use National Lead sheet. And if you would like our views on ways and means of getting optimum results from sheet lead installations, consider us at your service.

Look to the Leader for Lead

...in everything from lead pipe...valves...sheet...and lead-lined or lead-covered equipment...to complete acid recovery plants

NATIONAL

Lead Company

New York 6; Baltimore 3; Buffalo 3; Chicago 8; Cincinnati 3; Cleveland 13; Pittsburgh 12; St. Louis 1; Boston 6 (National Lead Company of Mass.); Los Angeles 23 (Morris P. Kirk & Son, Inc.); Philadelphia 25 (John T. Lewis & Bros. Co.); Atlanta (Georgia Lead Works, Div. of Cincinnati Branch); Toronto, Canada (Canada Metal Co. Ltd.).

Wing

AUXILIARY TURBINES

Wing Steam Turbines have been a dependable source of power in industrial and marine applications for over a third of a century. During that time these sturdy, dependable prime movers have been giving satisfactory service in thousands of industrial and marine installations under the most exacting conditions of service.

Wing turbines today are available for pressures up to 600 psi. and temperatures up to 750° F.

Write for turbine bulletin or for specific details.

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New York 11, N. Y.
Factories:
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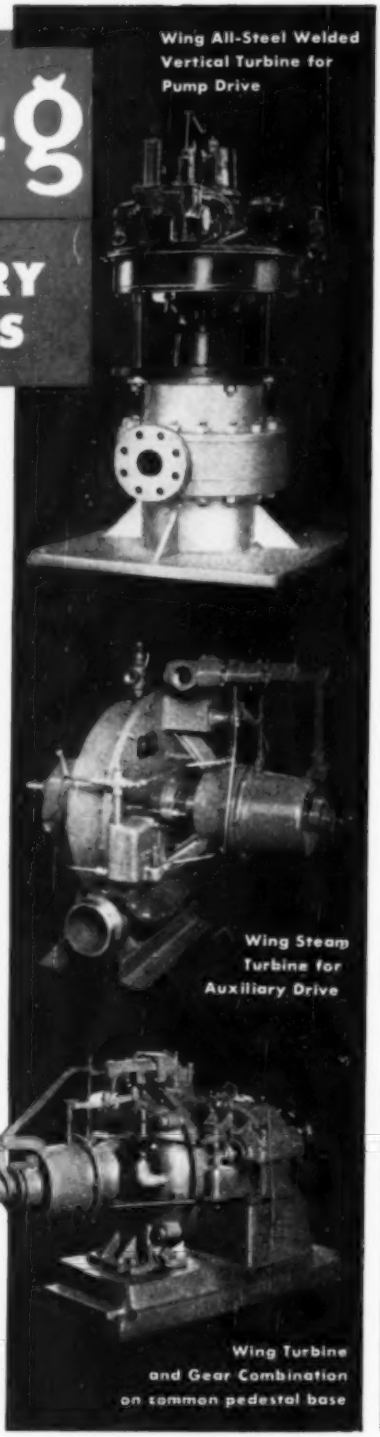


Wing All-Steel Welded Vertical Turbine for Pump Drive

Wing Steam Turbine for Auxiliary Drive

Wing Turbine and Gear Combination on common pedestal base

now being used annually in this country in the manufacture of a variety of products. Of the several synthetic rubbers on the market, each with its own particular properties and uses, the type known as GR-S is made in the largest volume.

Total United States consumption of GR-S last year was more than 345,000 tons, and this type of synthetic found application in articles ranging all the way from tack heads and crutch tips to the treads of passenger car tires.

Until about a year ago, butadiene and styrene were put together at a temperature of 122 deg. F. to form GR-S. Recently an improved form of the rubber—definitely stronger and tougher—has been developed by carrying out the operation at 41 deg. F.

E. L. Stangor and R. R. Radcliff, E. I. du Pont de Nemours & Co., before Rubber Division, American Chemical Society, May 25, 1949.

CORROSION

. . . *Titanium*

G. E. Hutchinson & P. H. Permar

Preliminary sea-water test data obtained at Kure Beach, N. C., reveal that commercially pure titanium is practically unaffected by exposure to sea water or marine atmosphere. With respect to galvanic corrosion in sea water, titanium occupies a position between cupro-nickel (70 Cu–30 Ni) and Monel in the galvanic series. Preliminary laboratory investigations of the corrosion resistance of titanium in a number of media typical of the chemical process industry indicate that its behavior is generally parallel to that of the austenitic stainless steels. However, this similarity is not complete: e.g., titanium is highly resistant to water-saturated chlorine, but is attacked by concentrated sulphuric acid.

G. E. Hutchinson, Remington Arms Co., and P. H. Permar, E. I. du Pont de Nemours & Co., before National Association of Corrosion Engineers, Cincinnati, April 13, 1949.

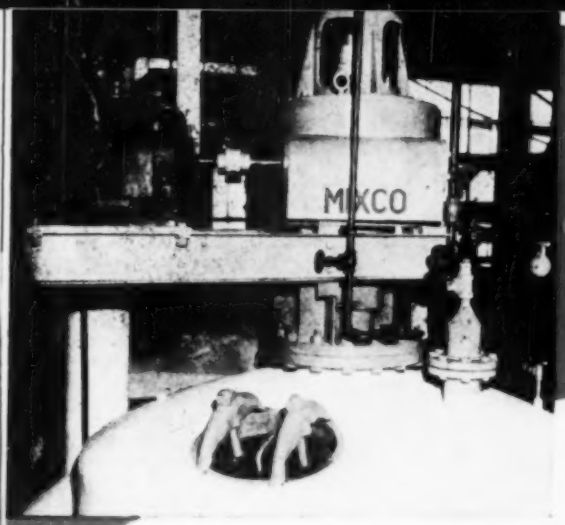
RESOURCES

. . . *Human vs. Mineral*

Harvey S. Mudd

The advances of civilization will not be retarded by a deficiency of mineral resources, providing one condition is met which condition is that research in the fundamental and applied sciences and engineering is wisely and generously supported. True conserva-

(Continued)



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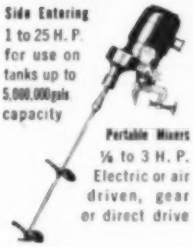
THE ACCEPTED STANDARD IN PROCESS WORK

Lightnin and Mixco Top Entering Mixers are specifically designed to be permanently mounted on open or closed, vacuum or pressure tanks.

They are equipped with standardized drives especially designed for mixing service with a minimum of maintenance cost. Every unit is delivered as a complete package, ready to install and operate. Built into them is Mixing Equipment Company's experience covering over a quarter of a century.

A wide range of sizes—1 to 50 H.P. with propeller type and turbine type impellers as well as paddles are available. Furnished in various materials to meet your specific operating conditions.

Side Entering
1 to 25 H. P. for use on tanks up to 5,000,000 gals capacity



Portable Mixers
⅛ to 3 H. P. Electric or air driven, gear or direct drive

LIGHTNIN & MIXCO MIXERS ARE NOW USED FOR . . .

- Mixing
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- Heat Exchange Improvement
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Name .....

Title .....

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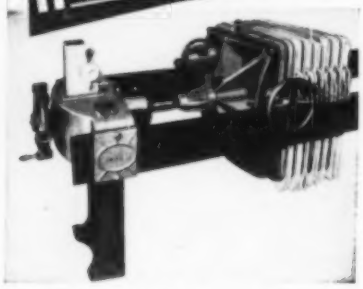
No More Hard Labor in Closing Filter Presses

NEW SHRIVER HYDRO-KLOSER



- SAVES WORK
- ASSURES SAFE FAST CLOSING
- PREVENTS LEAKAGE DIFFICULTIES
- EASILY INSTALLED

EASY TO OPERATE

Quick manipulation of the locking ring on the hydraulic ram and a few easy hand strokes on the pump—that's practically all there is to closing or opening a filter press—equipped with a Hydro-Kloser.

The simple hydraulic ram, operated by a small hydraulic pump, can be easily installed on 24" and larger Shriver Filter Presses without alterations — at moderate cost. Quickly pays for itself in time and labor saving; easier, tighter closure and greater safety to men and process. Makes manual closing of presses practically automatic. Write for operating booklet.

T. SHRIVER & COMPANY, Inc.
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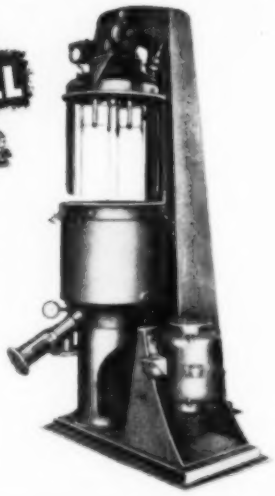
Mix Paste Type Materials More Uniformly–Much Faster

with This New ABBÉ—DISPERSALL Paste Mixer



This triple action mixer for pastes and heavy materials employs a combination rotary scraper and agitator mechanism mounted in the cover and a radially ribbed mixing disc in the bottom of the container to disintegrate, disperse and scrape the material from the sides rapidly.

Experience shows that pastes ordinarily requiring a long cycle of slow mixing can be processed with a saving of 60 to 80 per cent in normal processing time.

Provided with heavy cover and jacket, the Abbé-Dispersall Paste Mixer is ideally suited for either pressure, vacuum or high temperature operation. Capacities ranging from 5½ to 330 gal. Write for details.

ABBÉ ENGINEERING CO.
42 Church St., New York 7, N.Y.

tion is economy in use and we must look to the scientists and engineers to tell us what is the highest use. It will not be the abundance of scarcity of materials that will determine our destiny—it will be the skill with which they are used and our ability to develop new products which require less of those things that become scarce and costly.

As exhaustion proceeds it is the responsibility of engineers in all fields to put our natural resources to the highest use for it is the engineers who write the specifications. Thus our physical metallurgists are offering new alloys and new processes that give materials having superior properties to engineers with which to work and it is incumbent upon the engineers to make the best use of them, always with the future in mind. By accepting the principle of the highest use of all resources which is slowly but inexorably being forced upon us, the time may never come or at least it will be in the distant future when progress in advancing the wellbeing of all peoples will come to an end because they then are living in a have-not world.

In the last analysis we come back to the old proposition that the best asset of a nation is it human material. The industry, vigors and virtues of a people coupled with a high level of education are the qualities that will decide the issues of survival and progress. The part that engineering plays is manifest and thereon rests the pride we take in our profession.

Harvey S. Mudd, Cyprus Mines Corp., before Columbia University Engineering School Alumni Association, New York, April 28, 1949.

MANAGEMENT

. . . *Labor Efficiency*

Harold G. Osborn

There are two means by which management can increase the efficiency of its labor without a corresponding increase in labor costs. The first is the reduction of grievances by the selection and training of foremen who can express themselves understandably and who like to help people. This, if successful, will result in the partial elimination of the lost motion and lowered worker efficiency brought about by grievances.

Selection and training of first-line supervisors is absolutely essential here. If we set up the machinery capable of finding and selecting first-line foremen who talk understandable language

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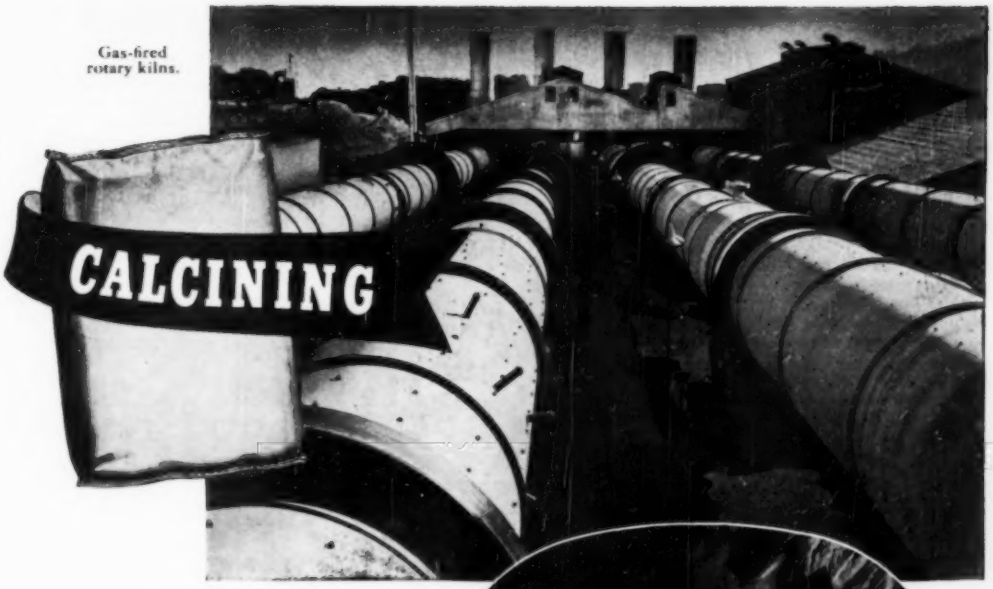

Gas-fired rotary kilns.

Rotary Kiln Operations at

PERMANENTE CEMENT COMPANY

Demonstrate High Temperature GAS *Firing*

Permanente Cement Company, Permanente, California.

CHEMICAL PROCESSES, such as calcination in cement manufacturing, are logical places for applying the productive flames of GAS. The rotary kilns at Permanente Cement Company, near San Jose, California illustrate the effective utilization of GAS in high temperature heat-processing.

At peak production, this Kaiser-directed cement plant has a capacity of 22,000,000 sacks annually. The calcining operation is performed in four rotary kilns, each 12 feet in diameter and 460 feet long. The burning zone is kept at 2800° F. and the material reaches a sensible temperature of 2700° to 2800° in the fusion zone.

In selecting the fuel for heat processing, Permanente engineers evaluated the cost of plant equipment and fuel, as well as the quantity and quality of available fuels—then they chose GAS and modern Gas Equipment because it met every requirement for production efficiency.

For any type of heat processing in chemical production, or in any industrial operation the logical fuel is GAS. Your local Gas Company Representative is ready to show you the advantages of effective utilization with modern Gas Equipment—call him soon.

MORE AND MORE...
THE TREND IS TO GAS
FOR CHEMICAL PROCESSING

AMERICAN GAS ASSOCIATION

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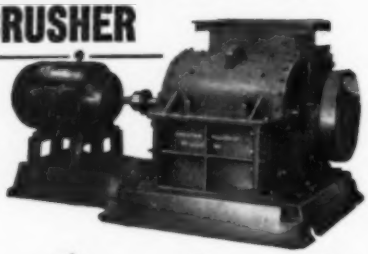
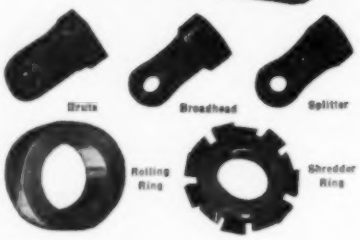
ASSURE UNIFORM REDUCTION *plus* HIGH TONNAGE with an AMERICAN CRUSHER

There's no need to sacrifice control of uniformity to gain high tonnage reduction of your materials. Efficient American Type 24 Crusher reduces all hardness of fibrous and friable materials quickly and uniformly, to assure dependable, high tonnage production—at low cost. Easy, external adjustments give a flexibility to accommodate a wide variety of materials—and a wide range of sizing.

The rugged, balanced American rotor can be equipped with rolling rings or shredder rings—or rotor can be supplied for any of three hammer types—to give you the flexibility and exact reducing action you require.





Write for information on the complete line of Americans.

American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1219 Macklind Ave.
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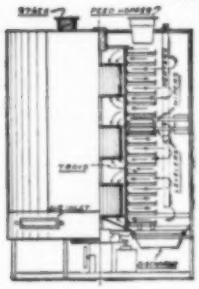
THE VERTICAL

TURBO-DRYER

CONTINUOUS TRANSFER TYPE



ADVANTAGES:

- No Dust Problem
- Uniform Drying
- Gentle Handling
- No Product Overheating
- Intermittent Product Turn Over
- High Thermal Efficiency
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- Prevention of Caking
- No Periodic Cleanout
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Packaged Turbo-Dryer units are available for Pilot Plant operation and for actual production. Capacities range between 1000 and 10000 pounds per day. Field erected units are engineered with evaporative capacities up to 25,000 pounds water per hour.

PAST EXPERIENCE

Turbo-Dryers have been used on chemical and food products for nearly 20 years. Even with very dusty products, dust collectors have proved unnecessary.

Wyssmont Company

Sublimation • Drying • Cooling • Oxidation

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and who are sympathetic, and then train them in the craft of foremanship as we would train an engineer, we can eliminate a large portion of grievances and materially increase productivity.

The second means to increase productivity is the application of well established engineering principles to the utilization of labor. It is reasonable to believe that the average worker will enthusiastically embrace a plan to increase his productivity if the proper incentive is offered. The first obstacle to overcome in the institution of a wage incentive plan is the human reluctance of men to work more effectively if, as a result, men are to be laid off. Assurance must therefore be given that men rendered surplus by the greater productivity of their fellows will be moved to some other job and will not be laid off except as a last resort. The normal turnover of an organization will generally keep pace with the number of persons rendered unnecessary by a wage incentive plan instituted stepwise over a number of years.

Earnings to a company from a wage incentive plan accrue because of the higher productivity. To determine the higher productive level requires careful research, but if study is given to improvement of tools and methods it can be ascertained as accurately as any other technical task in the plant.

To be workable an incentive program must have the support of the line organization. Before any project is undertaken the line should be conditioned to believe that the industrial engineer is a tool by which the line can profit.

Probably of more importance than any one thing is that men who are expected to increase their output in order to increase their earnings be sold on the possibilities of securing the additional earning. This can be done by conditioning them. Whether this can be accomplished by individual contact or through unions is a matter of personal preference.

Harold G. Osborn, Continental Oil Co., before 14th Midyear Meeting, American Petroleum Institute, Houston Apr. 4-7, 1949.

WATER

. . . *Public Law 845*

Carl E. Schwob

Pollution of North American waterways is a problem as old as the settling of the continent, increasing steadily and following precisely the expansion of industries and the growth of cities. (*Continued*)

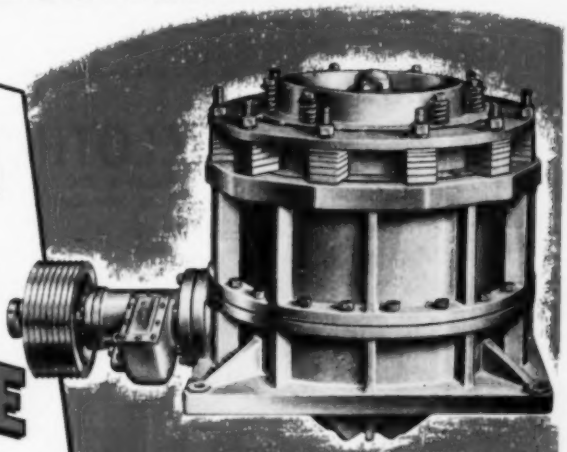
"CRUSHING WITHOUT RUBBING" CUTS PRODUCTION COSTS

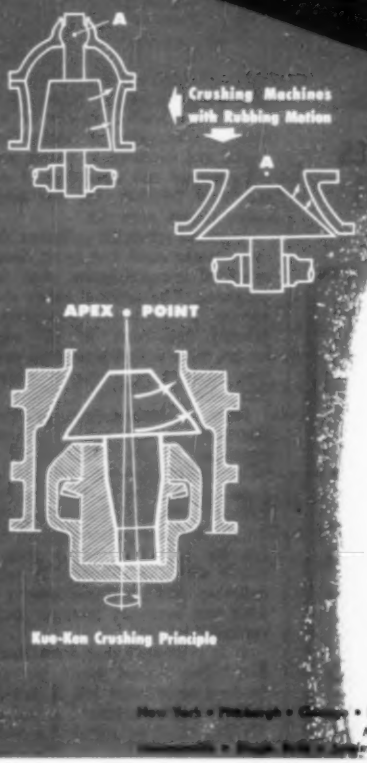
PENNSYLVANIA

Presents the

KUE-KEN GYRACONE

Less wear on Crushing Faces
—Lower Power Consumption





Friction is the archenemy of Crushers. Slipping, rubbing and grinding consume excess power, wear costly crushing faces, lower capacity. But note how the new Kue-Ken crushing head, when gyrating about its apex point, follows arcs that pass *squarely* through the crushing zone. Rock is instantly gripped and crushed, not forced upwards. This is proper engineering —positive, efficient crushing by *pressure only*. Faster, finer crushing at *less cost per ton*.

The new Kue-Ken Gyracone is a rugged, compact, powerful Crusher that needs little headroom, fits easily into your flow sheet. Frame is cast steel. Giant shaft is 5 times stronger than in ordinary cone crushers. Lubrication is abundant and sealed. An automatic switch stops the Kue-Ken if oil pressure is below normal; an overload release guards against tramp iron. The Kue-Ken Gyracone can be choke fed and is quickly adjustable for different product sizes. For mine, quarry, and industrial operations.

Exclusive Eastern Manufacturer and Distributor

PENNSYLVANIA CRUSHER COMPANY

DIVISION OF BATH IRON WORKS CORPORATION

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Manufacturers of a complete line of crushing equipment

Hammermills • Kue-Ken Jaws • Kue-Ken Gyracones • Granulators • Impactors • Bradford Breakers

When PRECISION is the word

JELLIFF HAS A MESH FOR IT

[particularly in the finer weaves, where hole size is vital to a delicate process.]

WIRE CLOTH

HAS LONG BEEN PREFERRED FOR ITS EXTREME ACCURACY and UNIFORMITY.

Meshes—as fine as 200 x 200—50 x 750 . . .
Materials—any ductile metal inert to your process . . .
Weaves—Straight, Twilled, Dutch-Twilled; crimped, calendered—or have you something new? We haven't been stumped yet on special orders.

Just send your specifications to
Department 15

THE C. O. JELLIFF MFG. CORP.
SOUTHPORT CONNECTICUT

FOR MIXING IN VACUUM
OR UNDER
INERT ATMOSPHERES
THE
VACUUM AGI-MIXER

For complete versatility in processing, the VACUUM AGI-MIXER offers in a single piece of processing equipment the following types of mixing action:

1. The high speed homogenizing action of the successfully proven EPPENBACH HOMO-MIXER.
2. The thorough blending action of a stainless steel double-motion paddle mixer equipped with fitted scraper blades.
3. Complete flexibility, permitting operation under atmospheric, vacuum, or pressure conditions.

• Complete with kettle of the highest quality, SEAMLESS DRAWN, highly polished. Furnished with a specially developed valve, complete with a Teflon self-aligning seal. This acts as a positive seal against leakage.

EPPENBACH, *Incorporated*
45-10 VERNON BLVD., LONG ISLAND CITY 1, N. Y.

CONVENTION PAPERS, cont. . .

Last year Congress did something about it by passing Public Law 845, administration of which is divided between the Public Health Service, Federal Security Agency, and the Federal Works Agency. The act declares the policy of Congress (1) to recognize, preserve and protect the primary responsibilities and rights of the states in controlling water pollution; (2) to support and aid technical research; (3) to provide federal technical services to state and interstate agencies, and to industries; and (4) to provide financial aid in the formulation and execution of stream pollution abatement programs.

The aggregate pollutional loadings on surface waters of the nation have steadily increased since 1900. During the thirties substantial improvement in stream conditions occurred, but through the war years material allocations for sewage and waste treatment works were made only where an acute public health necessity existed and as a result few remedial works were built. Since V-J Day, continued material and labor shortages have restricted building. These construction limitations have resulted in major increases in total pollutional material reaching streams.

Comprehensive programs contemplated under the law include the determination of pollution status, practical raw water quality to be achieved by remedial works, priority of water uses, construction of anti-pollution works, and measures to insure proper maintenance and operation of waste treatment facilities, for the nation's major stream networks.

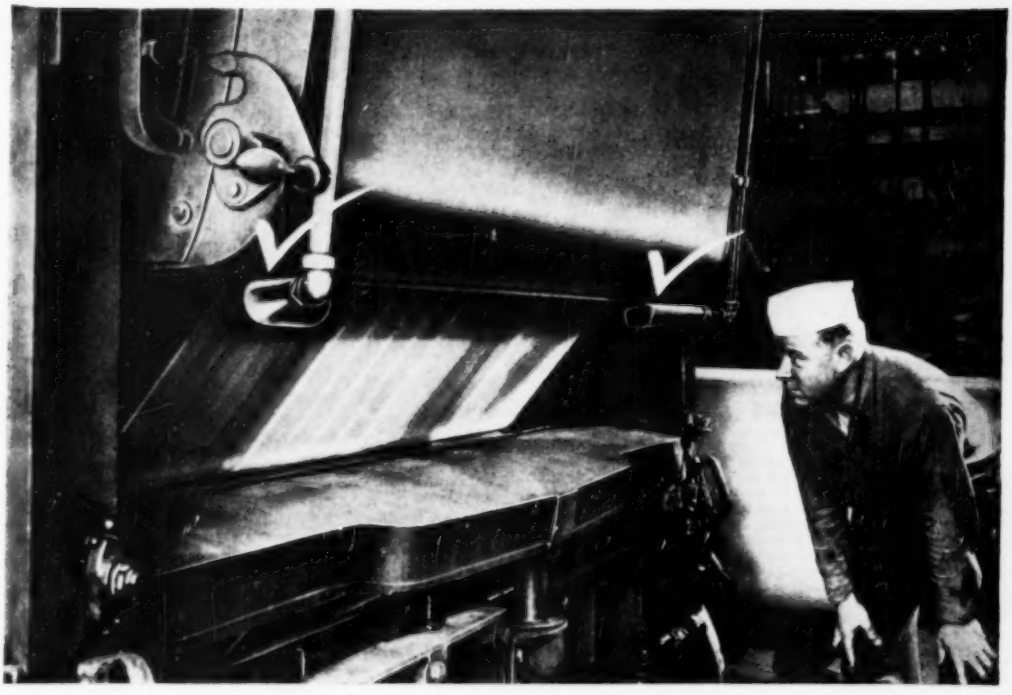
Aggresive action for pollution abatement works need not await development of comprehensive river basin programs. The national policy should require a minimum consisting of primary treatment of all organic wastes, with design provisions permitting addition of advanced states of treatment.

In the industrial field, insufficient attention has been paid to reclaiming byproduct wastes for beneficial purposes. This issue will become more pronounced as we further deplete our national resources. The responsibility for development of treatment methods for industrial wastes rests primarily with the industry. It has the technical staffs and abilities to conduct the necessary research and investigations.

It is estimated that from three to five billion dollars would be needed to do a respectable job in initial installations for abatement of pollution. To this must be added the costs of

(*Continued*)

"We've put out more than one fire here...



...and the presses started rolling again RIGHT AWAY!"

When you *have* to use flammable solvents in a room filled with static electricity—you *must* guard against the possibility of fires. You can stop them dead in their tracks—before a bit of damage is done.

The New York Daily News *proved* this when it installed a *Kidde** Built-in System in its rotogravure press room. Those fires that *have* started never got to first base! The *Kidde* equipment put them out in just a few seconds.

No fire damage—no downtime for after-fire clean-up—because the carbon dioxide (CO_2) from a *Kidde* System leaves no mess behind. The presses were ready to roll the instant the blaze was killed!

Wherever there's a tricky fire hazard, Kidde is ready with the answer! If *you* have a fire protection problem, a Kidde representative will help you.

When you think of CO_2, call Kidde!

*Also known as "LUX"

The words "Kidde" and "Lux" and the Kidde seal are trade-marks of Walter Kidde & Company, Inc.

K Kidde **Kidde**

Walter Kidde & Company, Inc. • 928 Main Street, Belleville 9, N. J.

LOOK WHAT'S HAPPENING on the Texas Coast

HERCULES STRONG FOR TEXAS

The Hercules Powder Company has taken over a 28-acre site in the San Jacinto Ordnance Depot near Houston, to which it has moved its plant from Louisiana, Missouri. In its new location the company will act as a contract operator for the government, producing anhydrous ammonia. Production starts this summer, is expected to reach a total of 50 to 100 tons daily. Ammonia will be distributed to other manufacturers in the area to be used in the making of ammonium sulphate for fertilizers.

SOUTH TEXAS COTTON OIL INSTALLS NEW PROCESS

A $400,000 plant has recently been completed by South Texas Cotton Oil Company of Houston to produce hydrogen from natural gas by the Girbitol process. Built by the Girdler Co., it is said to be the second such plant in the country. Capacity is 200,000 cubic feet of hydrogen a day, most of which is to be used by the company itself in the hydrogenation of cotton seed oil for cooking fats.

TALL TALE... BUT TRUE

A rancher, interested in seeing a Champion bull, arrived at the Fat Stock Show with his wife and ten children. When the ticket-taker requested 50c apiece for those over 12 years and 25c for those under, the rancher appealed to the assistant manager.

"Me and the family come 200 miles to see that Champion bull, but we can't afford $3.75 for tickets."

"All those children yours?" asked the official.

"Yep."

"Well, you come right on in as our guests, Mister. We want that bull to see you!"

THE CHEMICALS ARE COMING

One by one the big names in the chemical industry are discovering the opportunities offered by the Texas Gulf Coast. And established industries are expanding, installing new processes. Investment is already around the billion mark and this is only the beginning. Check for yourself these attractions: unlimited quantities of acids, bases, fresh water and natural gas for hydrocarbons: reasons why your industry can profitably FOLLOW THE TREND TO TEXAS.

To help you find out more about the area we serve, we will gladly: (a) make a survey engineered to your company's needs; (b) supply you with any special information you require; (c) show you the coast country from Orange to Corpus Christi—all in strictest confidence. Write, wire or telephone Houston Pipe Line Company, Houston, Texas.

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operation, maintenance, expansion, and replacement. With respect to the immediate situation, funds authorized under the Water Pollution Control Act have not been appropriated. It must be emphasized that at present there are no funds available for any purpose. For the fiscal year 1950, which began July 1 of this year, we anticipate that there will be appropriated the $1,000,000 authorized for grants to states and interstate agencies for research, investigations, surveys and studies for water pollution caused by industrial wastes.

Basic research has lagged in the United States in almost every field of study. Water pollution control is no exception. Moreover, the problem is never static; it changes as industry develops and conditions of living change. To be effective, measures for pollution control must be kept abreast of the dynamic development of industry.

With full cooperation between public and private agencies and industry, substantial progress can be made under the five-year provisions of Public Law 845. Congress and all the interested groups realize that this will be only a beginning.

Carl E. Schwob, Public Health Service, before American Society of Civil Engineers, Oklahoma City, April 20, 1949.

—End

FOREIGN LITERATURE ABSTRACTS

Stability of Magnesium Ammonium Phosphate

Magnesium ammonium phosphate is valuable as a fertilizer containing phosphorus, nitrogen and magnesium, and as a water-insoluble fireproof material. Its great disadvantage, however, is its instability when stored even at temperatures of 30-50 deg. C. A practical method was therefore sought for preventing $MgNH_4PO_4 \cdot 6H_2O$ and $MgNH_4PO_4 \cdot H_2O$ from decomposing at higher temperatures. These two compounds were synthesized and tested for stability at temperatures of 20-80 deg. in the pure form and covered with a ceresin film. The hexahydrate form lost very little ammonia when stored at a temperature of 18-21 deg. with air passed over it for 5 hr. The loss increases with increase in temperature and it reaches 30 percent

(Continued)

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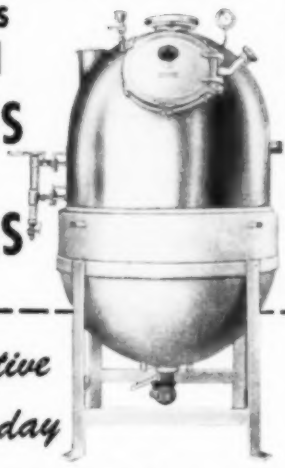

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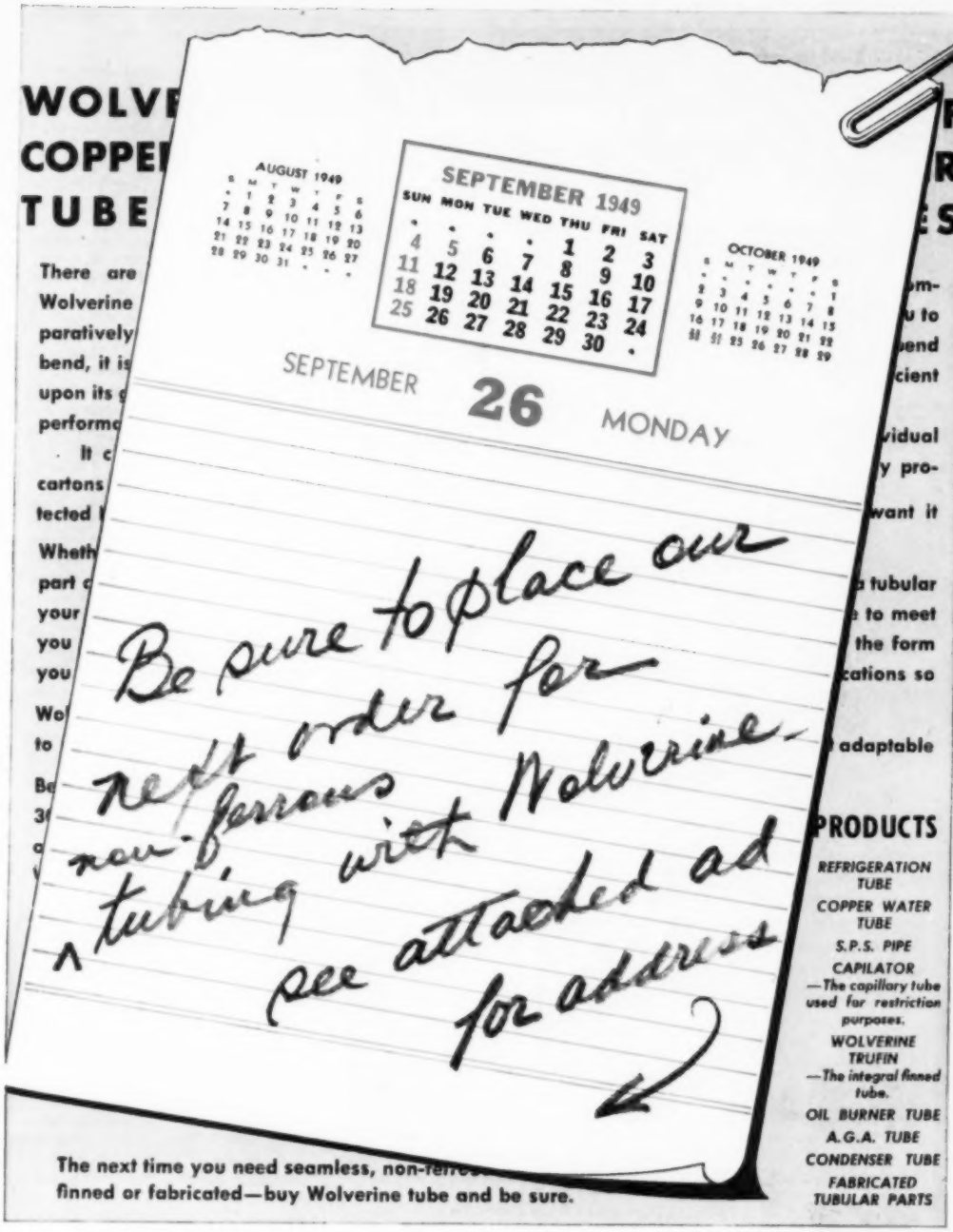
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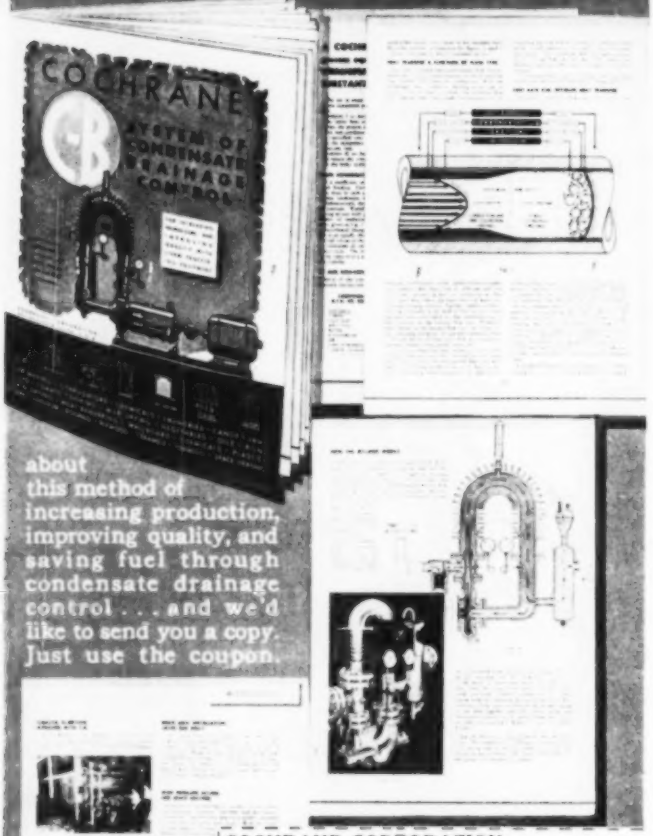

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of the original ammonia content at 80 deg.; there is also a 17 percent loss of water. Moistening the salt increases the loss of ammonia; addition of 4 percent water increases the loss by approximately 10 percent. When the salt was stored in a dryer over concentrated sulphuric acid at 20 deg. for 4 months it lost 28.8 percent of its weight, the ammonia representing 2.7 percent and the water of crystallization 26.0 percent. The hygroscopicity of the hexahydrate form of magnesium ammonia phosphate is such at 100 percent relative humidity and 20 deg. that the increase in moisture is 15 percent during a period of 6 months. The monohydrate salt $MgNH_4PO_4 \cdot H_2O$ was prepared from the same reagents as the hexahydrate form but at a temperature of 100-102 deg. with subsequent drying at 106 deg., and it showed a relatively high stability. Losses of ammonia were insignificant during storage and the hygroscopicity was much less than for the hexahydrate salt. Crystals of $MgNH_4PO_4 \cdot 6H_2O$ covered with a film of ceresin from a benzene solution could be heated to 80 deg. with little decomposition. The ceresin film was 0.5 percent of the weight of the salt and it preserved 99.7 percent of the ammonia content in the salt at a temperature of 80 deg. C.

Digest from "Magnesium Ammonium Phosphate, Its Thermic Stability and Stabilization" by S. I. Volfkovitch, R. E. Reneva, and T. S. Rosenberg. *Zhurnal Prikladnoi Khimii* XXII, No. 5, p. 448-454, 1949. (Published in Russia.)

Chemistry of Xanthogenic Acid Thioanhydrides

Thioanhydrides of xanthogenic acids (monoxanthogen sulphides) are similar in structure to the anhydrides of organic acids in which all three atoms of oxygen are replaced by sulphur atoms. They also are prepared most frequently by the action of the acid chlorides on their salts, rather than by the direct elimination of water from the acids. The first thioanhydrides, for example, were prepared by the action of the acid chlorides of organic acids or their esters on the salts of xanthogenic acids. Some of the chemical properties of the thioanhydrides of xanthogenic acids are the same as those of xanthogen sulphides or dixanthogenides. Action of alcohol solutions of alkali and ammonia on the thioanhydrides of xanthogenic acids results in the formation of the corresponding xanthogenates, but there is no liberation of elementary sulphur. The thioanhydrides of cellulosoxantho-

(Continued)

He can see a thousand miles

ALARM INDICATOR RECORD

TIME RECEIVED | A P | BY | ROUTINE / COURIER | DATE OK | TIME | A P | BY

SYNCHRONIZATION - START					CA FAIL SEND CKT.
ON	ON	OFF	ON	ON	CHAN. 1 SECT
SYNCHRONIZATION - STOP					FUEL GAS LOW
ON	ON	OFF	ON	ON	

FUSES		24-VOLTS		ABS	
DISCH.	DIST.	H-L VOLT	REG. FAIL	24V 130V	48V

POWER CONTROL PANEL FAILURE					
201-202W	203-204W	205-206W	207-208W	201-202E	203-204E

ALT. CONT. BAY - NO VOLT. OUT.				NO VOLT. - TRAN	
201 202	203 204	205 206	207 208	201 202	203 204

		RECTIFIER - INVERTER FAIL		
RECT. FAIL 24/130V	48 V H-L VOLT	NO. 1	NO. 2	NO. 3

STATION IDENTIFICATION

64 KC PILOT ALARM AT NON-SW. MAIN								3096 (WKG. LINE) PILOT AT SW. MAIN			
201	202	203	204	205	206	207	208	201 203	205 207	202 204	206 208

2064 KC PILOT ALARM AT NON-SW. MAIN								3096 (SP. LINE) PILOT AT SW. MAIN			
201	202	203	204	205	206	207	208	201 203	205 207	202 204	206 208

3096 KC PILOT ALARM AT NON-SW. MAIN								SP. LINE FAIL AT SW. MAIN			
201	202	203	204	205	206	207	208	201 203	205 207	202 204	206 208

TOT. LINE FAIL AT SW. MAIN				AUTO. SWITCH AT SW. MAIN				AUTO. SW. LOCKED AT SW. MAIN			
201 203	205 207	202 204	206 208	201 203	205 207	202 204	206 208	201 203	205 207	202 204	206 208

CARRYING hundreds of telephone calls, coaxial cable runs through many lonely miles. Far from towns and people, master amplifying stations stand guard with a new automatic alarm system developed by Bell Telephone Laboratories.

At a city terminal, the man on duty makes a check by laying a transparent log sheet over a glass window, and dialing a master station hundreds of miles away. At once the station begins to give an account of itself, lighting lamps under the log sheet to report any abnormal operating condition before it becomes an emergency.

But when something happens that threatens serious trouble, the apparatus acts at once—maybe by switching in a spare coaxial—and calls a distant test board by ringing a bell. Sometimes he can take further steps by remote control; if not, he knows exactly how to brief the nearest repair crew.

With this new alarm system, maintenance men need not be stationed at isolated points, just waiting for something to happen. Instead, they live in their home communities. This makes for better work . . . and better telephone service.

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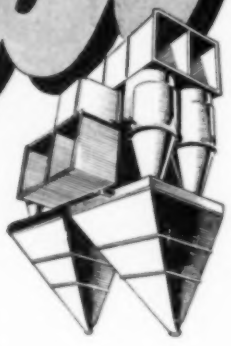

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genic acid can be prepared by a number of methods used in the preparation of the thioanhydrides of other xanthogenic acids; they can react with alkalis and amines like the thioanhydrides of the simplest xanthogen derivatives, forming analogous products. Their difference is that they decompose under the action of even aqueous solutions of alkalis and ammonia. An aqueous solution of alkali reacts on the thioanhydrides of cellulosoxanthogenic acid to form cellulose xanthogenate, with carbonyl sulphide as a byproduct. An aqueous solution of ammonia reacts with these thioanhydrides to form cellulose ammonium xanthogenate. Aniline reacts with them to form xanthogen anilide, with hydrogen sulphide as a byproduct. Thioanhydrides cannot exist in viscose solutions (total alkalinity of which is approximately 7 percent).

Digest from "Chemistry of Viscose and Xanthogenates. V. Thioanhydrides of Xanthogenic Acids and Their Conversions" by S. N. Danilov, N. M. Grad and V. O. Clesman, *Zhurnal Prikladnoi Khimii* XXII, No. 6, 625-632, 1949. (Published in Russia.)

Acryl Nitriles—

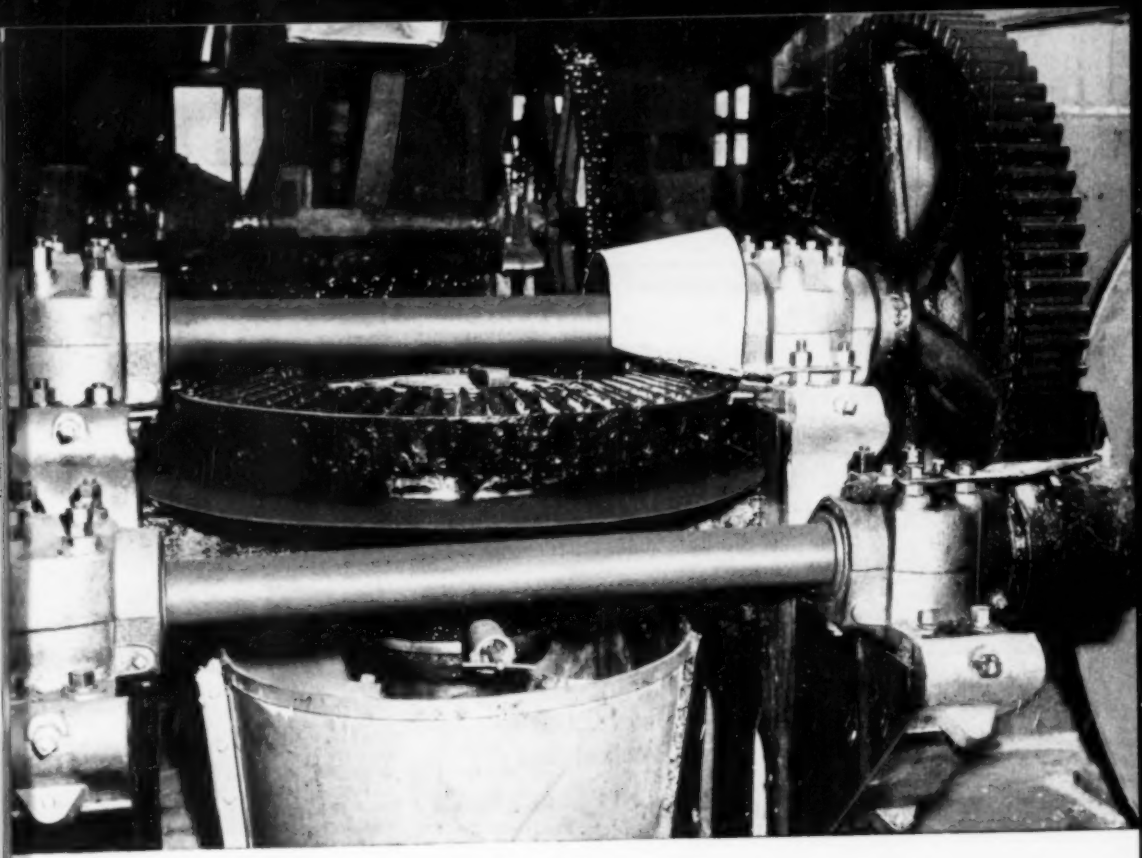
Acrylic acid and its derivatives are among the most important polymerizable vinyl compounds. Acryl nitrile (commonly known as acryl nitrile) is not only the foundation of acrylic acid chemistry, but is also a highly polar ethylene compound and therefore unusually polymerizable. Different addition reactions can also be carried out with the C—C double bond so that it can serve as the source of a large number of new aliphatic compounds. This article gives detailed information on the properties of acryl nitrile, its preparation, its reactions—including diene syntheses, polymerization, addition to hydroxyl compounds, addition to —SH— compounds, addition to —NH— compounds, additions to acid amides, addition to carbon compounds, addition to hydrogen cyanide, halogenation, saponification, etc.

Digest from "Chemistry of Acryl Nitrile" by O. Bayer, *Angewandte Chemie* 61, No. 6, p. 229-241, 1949. (Published in Germany.)

Aluminum — German production rose from 30,000 tons per year in the 1920's to 264,000 tons in 1942. This 1½ page article gives the cost of producing aluminum from bauxite, and a brief description of the condition and activities of the plants in the different regions of Germany.

Digest from "Germany's Light Metal Industry" by E. A. Struss, *Chemie-Ingenieur-Technik* 21, No. 5, p. 75-76, 1949. (Published in Germany.)

End



Cuts grease consumption by 1/3

Lubricant drippage from the exposed gears on a pulp press caused trouble and expense for a midwest sugar-refining company. Renewal of the grease took time and labor, raised lubricant consumption.

At the suggestion of a Standard Oil Lubrication Engineer, a switch was made to a Calumet Viscous Lubricant. Despite severe conditions of heat and work, this grease did not thin out excessively. It adhered to the gears. Fewer applications were required. Lubricant consumption was cut by one-third.

Where open gears, as well as some enclosed types, are difficult to lubricate, try Calumet Viscous Lubricants. Their superior adhesive quality and greater wetting ability give them high resistance to the washing action of water and to thinning and throw-off at high temperatures. All grades of Calumet Viscous Lubricants can be applied without heating, and all but the heaviest grade can be applied by spraying. A Standard Oil Lubrication Engineer will help you choose the proper grades for your equipment.

Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

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FACTS ON FILTERING

Representative case histories on widely varied clarification problems condensed from field reports of Johns-Manville Filtration Engineers

Lens Polish Maker Saves Time Filtering Sulphuric Acid With Filter-Cel

(reported by J-M Engineer J. H. Corbett)

NEW YORK DISTRICT: This company produces a glass lens polish. Filtration is an important step in the process and is used for removing fine silica particles from sulphuric acid.

Before they used any filter aid, it took 10 hours to filter a 1200-gallon batch of the acid solution through a 24" x 24" plate filter. The screen quickly became clogged with silica which seriously cut down the flow rate.

Using 25 lbs. or .25% of our Filter-Cel, we reduced the cycle time to 2½ hours. This gave an increase in flow rate from .75 gal. per sq. ft. to 3 gal. per sq. ft. per hour.

By doubling the amount of filter aid, I demonstrated that the cycle time could be further reduced to two hours, but since the additional half-hour saved is not important, and they were well satisfied with the first trial, they will continue with the 25 pounds of filter aid used in the original run.

Gets 1000 Gal. Step-Up In Soap Filtration With Hyflo Super-Cel

(reported by J-M Eng. P. A. Martinson)

MINNEAPOLIS DISTRICT: While making a service call on a soap manufacturer recently, I found they were having trouble filtering scrub soap.

I inspected their filter station and found that they were covering their cloths with a light paper to make for easier cleaning. During the filtering operation this paper became discolored and showed evidence of plugging. In order to keep the slime off the paper, I suggested that they precoat with Hyflo Super-Cel and also use Hyflo in the main body filtration. I also recommended that they make a change in the type of filter cloth they were using.

Previously, they had been getting 900 to 1000 gallons through per eight hour shift. On the run with Hyflo, we put 2000 gallons through in the same period. Needless to say, they were pleased with the improvement and will continue to use Hyflo.

Helps New Filter Station Off To Good Start

(reported by J-M Eng. W. J. Buckley)

PHILADELPHIA DISTRICT: One of my customers was setting up a new filter station for the reclamation of kerosene wash solvent. They called on me for help and I made a trip to their plant to help them get started.

This solvent is used by them for cleaning printing rolls, and contains not only ink and color, but some grease as well. The installation included a small 24 sq. ft. filter and a direct connected herringbone gear pump driven by a ½ H.P. motor. It has an automatic cutout at 20 lbs. pressure. The filter screens are covered with cotton cloth which we precoated with 3 lbs. of Hyflo Super-Cel by recirculation.

Examination of a sample of the solvent returning to the precoat tank showed it to have good clarity and the flow was then switched over to the clear solvent tank. I also recommended the substitution of a centrifugal pump for the gear pump so that they can take full advantage of the maximum pressures possible with their filter.

Hyflo Makes Apple Pressing Easier

(reported by J-M Eng. F. D. Richards)

CINCINNATI DISTRICT: During my first call on this customer, I recommended the use of 2% Hyflo Super-Cel as a pressing aid in their apple pulper.

Recently, when I called again, they informed me of their results. Ordinarily, with the kind of apple they are using at present, the press cake is squashy and slippery. With Hyflo, the cake is much firmer and they are able to operate the press at a higher pressure. This, according to their estimate, has increased the juice yield by approximately 5%.

Although with other types of apples, no increase in yield has been noted, the addition of Hyflo does permit easier stripping of the cake, and this advantage alone is sufficient to justify its use.

How To Get Help With Your Filtration Problems . . .

If you are not getting the desired clarity or if your filtration flow rates are too slow, here is a helpful suggestion. Just call in your nearest Johns-Manville Filtration Engineer. His experience with all types of filtration problems should enable him to locate and correct the trouble without difficulty. If your present filter aid is at fault, he can recommend a grade of Celite Filter Aid that will give you any required combination of clarity and flow rate. Just write Johns-Manville, Box 290, New York 16, N. Y., for the address of the J-M Filtration Engineer nearest you.

Johns-Manville JM

Celite **Filter Aids**

Reg. U. S. Pat. Off.

Chemical Engineer's Bookshelf

LESTER B. POPE, Assistant Editor

Roster

WHO'S WHO IN PLASTICS. Society of the Plastics Industry, Inc., 295 Madison Ave., New York 17, N. Y. 244 pages. $4.50 for SPI members; $5.50 for non-members.

The great expansion of the plastics industry during the past decade well warrants publication of this book. The biographical section lists the names of 2,989 individuals, their present and past affiliations, date of each, position in each case, and educational background. The company section of the book lists names and addresses, key officers, positions of each, company products, and methods of manufacture.

The book includes representatives of important molders, laminators, fabricators, extruders, vinyl film processors, material manufacturers, machinery manufacturers, product designers, research organizations, publishers, and consulting engineers. Emphasis is put on those in the United States and Canada although important plastics industry men from all over the world are included.—*RW*

Universal Raw Material

THE COMING AGE OF WOOD. Egon Glesinger. Simon & Schuster, New York. 279 pages. $3.50.

Reviewed by Robert S. Aries

Being abundant and inexhaustible, wood has a brilliant future as a chemical raw material. That is the theme of Dr. Glesinger, chief of the Forest Products Branch of the Food and Agriculture Organization of the U.N. The young yet veteran wood products economist was able to digest the technical aspects of the field and present them with the broad vision of an economist. Forests cover one fourth of the land area of the world, yet only a fraction of them is utilized at present. Wood supplies shelter, fuel, textile fibers, plastics, paper and has a myriad of other uses. It can also supply motor fuels and lubricants, food for men and animals. Dr. Glesinger's vision, untempered at times by a concern over costs of production and competing raw materials, has given chemical engineers a veritable challenge for new product and process development in the field of wood chemistry.

The appalling waste of wood by American industry is understandingly criticized by Dr. Glesinger, who is well acquainted with European practices. The blessing of being able to afford such waste at present, is hardly a good excuse for wasting 200 million tons of cellulose and lignin annually. Here again waste utilization should be perhaps tempered more with costs and plant economics, but the case for integration, advocated by Dr. Glesinger seems to be sound. Wood should be treated as a universal raw material in an interlocking combination of factories producing both mechanical and chemical derivatives.

Many of the things which the book recounts have already taken place here in the last decade or so. In previewing many of the others, "The Coming Age of Wood" is optimistic, inspiring and readable by both the technical man and the layman.

World Data

YEARBOOK OF FOOD AND AGRICULTURAL STATISTICS—1948. Published by Food and Agriculture Organization of the United Nations, 1201 Connecticut Avenue N. W., Washington 6, D. C. Volume I "Production." 285 pages; $3.50.

World acreage and production data of principal agricultural crops, including production of livestock and livestock products, are now available for years up to and including 1947. The yearbook was established in 1947 by FAO to carry on the work formerly done by International Institute of Agriculture at Rome. The 1948 edition has been expanded in scope and improved in several respects over the 1947 volume.

A second volume is to be available later this year, covering international trade in food and agricultural products. Volume I, which is now available, deals primarily with production statistics.—*GWM*

RECENT BOOKS RECEIVED

Elastomers and Plastomers. Vol. II. By R. Houwink. Elsevier. $9.

Heat Transfer. Vol. I. By Max Jakob. Wiley. $12.

Industrial Toxicology. By L. T. Fairhall. Williams & Wilkins. $6.

Organic Coatings in Theory and Practice. By A. V. Blom. Elsevier. $6.

Petroleum Refinery Engineering. 3rd ed. By W. L. Nelson. McGraw-Hill. $9.

Novel and Useful

HANDBOOK OF PATENTS. By Harry Aubrey Toulmin, Jr. D. Van Nostrand Co., New York. 800 pages. $9.

Reviewed by A. W. Deller

Something novel and useful in the patent text art has been achieved by Mr. Toulmin in his "Handbook of Patents." Evidently not designed and not intended for those skilled in the art of patent prosecution, it succeeds in laying the foundation for a "well-informed layman." Without going into a detailed discussion of, and reference to, the decided cases on the various phases of patent rights and patent prosecution, the author has prepared a valuable over-all view of the nature of inventions, research, and the workings of our patent system, with a series of valuable chapters explaining from a layman's point of view, the procedure to be followed at each stage of making and protecting an invention.

The text opens with a chapter on "Invention, Research, and Reasons for Our Patent System; Its Economic Background; How the System Works." This is followed by a chapter on the constitutional basis of our patent laws and a summary of the various patent laws passed from the time of the adoption of the constitution to the present date. Then follows a review of patent fundamentals, a discussion of how to prepare and file a patent application and procedure in the Patent Office. Especially valuable is the chapter on "How to Keep Patent Records," for the inventor's skill in making inventions is often in inverse ratio to his knowledge of the necessity for, and ability to keep adequate written records of critical dates in connection with the conception and reduction to practice of his invention. This chapter is adequately illustrated with a series of invention record sheets and forms.

Each subject is prefaced by an "Author's Note," designed to "orientate" the reader to the matter to be discussed. Exceedingly helpful are the chapters on various "Special Types of

(Continued)

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AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

Books, cont. . .

Patents," such as "Calculating and Computing Machines," "Chemical Patents," "Close Limit Industries—Dimension Patents," "Dispensing and Vending Machine Industry," "Food, Drug, and Cosmetic Patents," "Electric and Electronic Patents," "Garment Industry," "Mechanical Movement Patents," "Metallurgical Patents," "Patentability of Materials," "Plant Patents," and "Design Patents."

The concluding section of the book deals with "Ownership of Rights Under Patents" and covers the sale and licensing of patent rights, here and abroad, as well as the steps to be taken so as not to run afoul of the anti-trust laws. An especially valuable chapter in this section is that on "Patents in the Income Tax Return."

All in all, Mr. Toulmin's Handbook satisfies a long-felt need and should meet with the success it deserves.

Fuels and Oils

BRENNSTOFFE, KRAFTSTOFFE, SCHMIERSTOFFE. By Bruno Riediger. Springer-Verlag, Berlin. 484 pages. DM 35.40.

Reviewed by W. F. Faragher

"Many engineers who design, build, or operate machines show a disinclination to concern themselves with the chemistry of fuels and lubricants, although such knowledge is an indispensable aid in their work. They do so because of the prejudice shared by many who are not chemists toward this 'cryptic science'—a prejudice that is totally unjustified, since there is scarcely a science that presents such an orderly structure as does chemistry."

"If this book supplies him (the engineer) useful aid and spurs him to a further deepening of his knowledge in the fields of his particular interest, the desired goal of the author has been realized."

These excerpts from the preface and the final paragraph of the book set forth amply the author's purpose in writing the book, and mirror the contents generally.

The first of the four sections (185 pp.) reviews the chemistry of the principal homologous series of the hydrocarbons and their derivatives of interest in the subject field, featuring the structural formulas (116 pp. of standard handbook type seem excessive). The role of functional groups and the relationship of properties to structure and molar weight are presented adequately and largely in a sufficiently elementary manner.

The physico-chemical presentation

(Continued)

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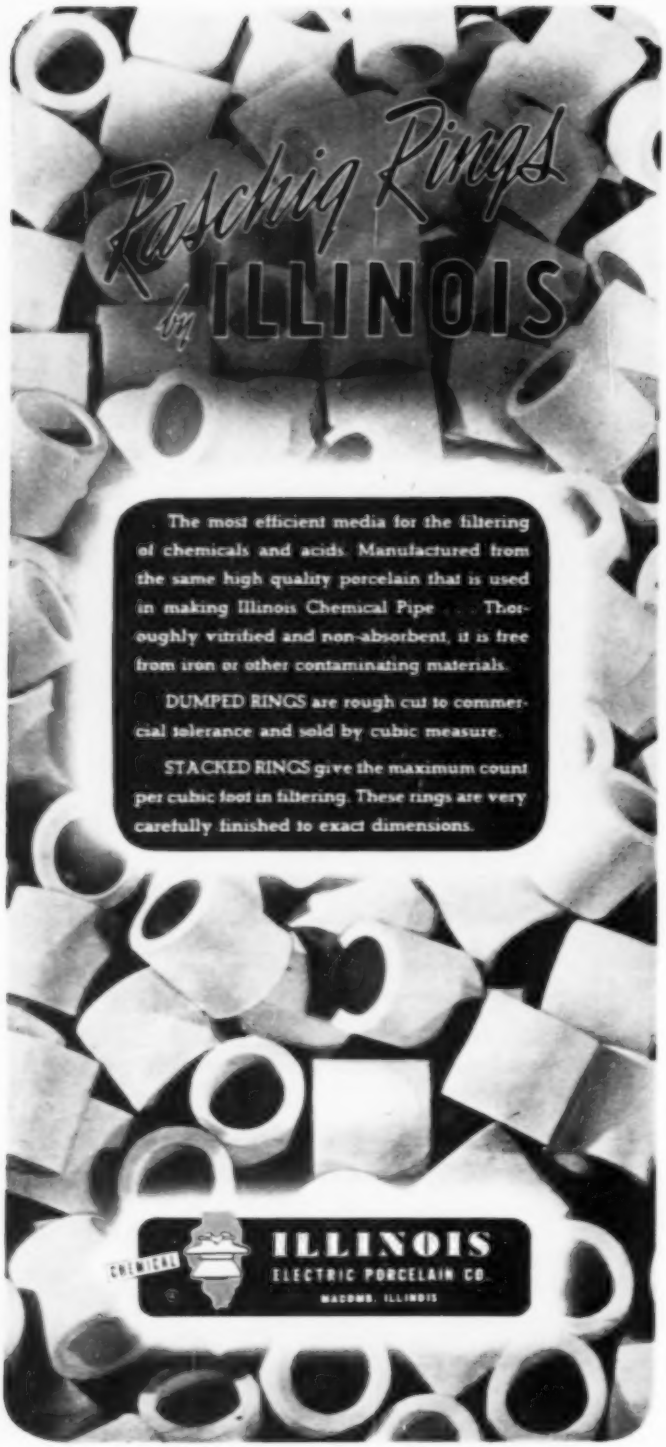
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(Section II, 104 pp.) places a higher demand on the engineer, since many of the subjects chosen are carried beyond their elements: the engineer will, in many cases, be taken beyond his student courses. However, the treatment is logical and clear, and helpful references to amplifying and supporting material in the literature most normal to the engineer are provided. This requirement has brought a great preponderance of references to continental journals, often to the exclusion of better material in others.

The occurrence and properties of the natural and synthetic fuels (solid, liquid, and gaseous) are discussed in Section III (94 pp.). Fuel technology is, of course, described quite briefly. It is unfortunate that the latest processes were not always selected. Reforming, for example, was not chosen at all and is even incorrectly defined as the term in use for catalytic cracking. Hydroforming, therefore, is said to be derived from this term, and the Houdry fixed-bed process to be one of the most modern examples.

Finally, Section IV (75 pp.), deals with the technically important properties of fuels and lubricants, explaining or indicating the chemical aspects of the properties involved in suitability and use requirements.

The book is well written and should serve its purpose satisfactorily. Typographical errors are few and usually of the "self-correcting" type, as, e.g. in Formula 36 on p. 260, where the first "m" should be an "n"; in the structural formula of dicyclopentadiene on p. 353, which is in fact that of the tetrahydro derivative; and in the last sentence of p. 367, where the catalyst used in the Houdry catalytic cracking process is stated to be "aluminum silicate and aluminum chloride."

It is pleasing to see again a German publication on paper of good quality.

American technologists who have an interest in the German language will find this book to be written in an easy style, and they can gain a good orientation in the currently used nomenclature of the field.

The Hard Way

THE STRUCTURE OF MATTER. By Francis Owen Rice and Edward Teller. John Wiley & Sons, New York. 261 pages. $5.

Reviewed by Frederick C. Nachod

Few will argue that the book by Drs. Rice and Teller is a useful contribution. However the question of degree of usefulness is open to considerable discussion. The text claims

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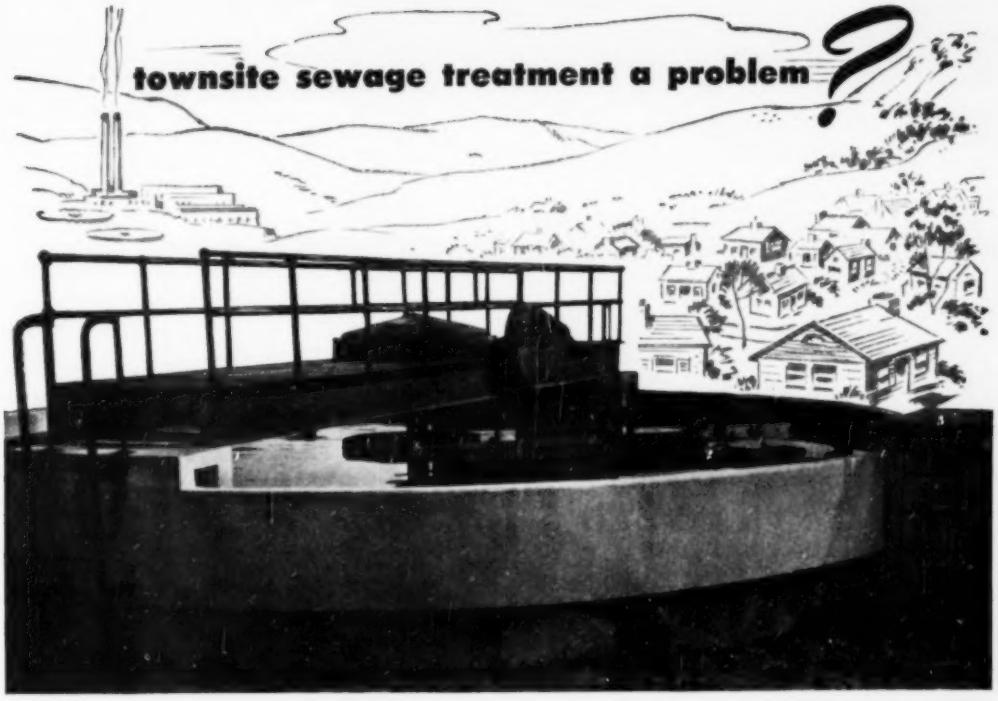

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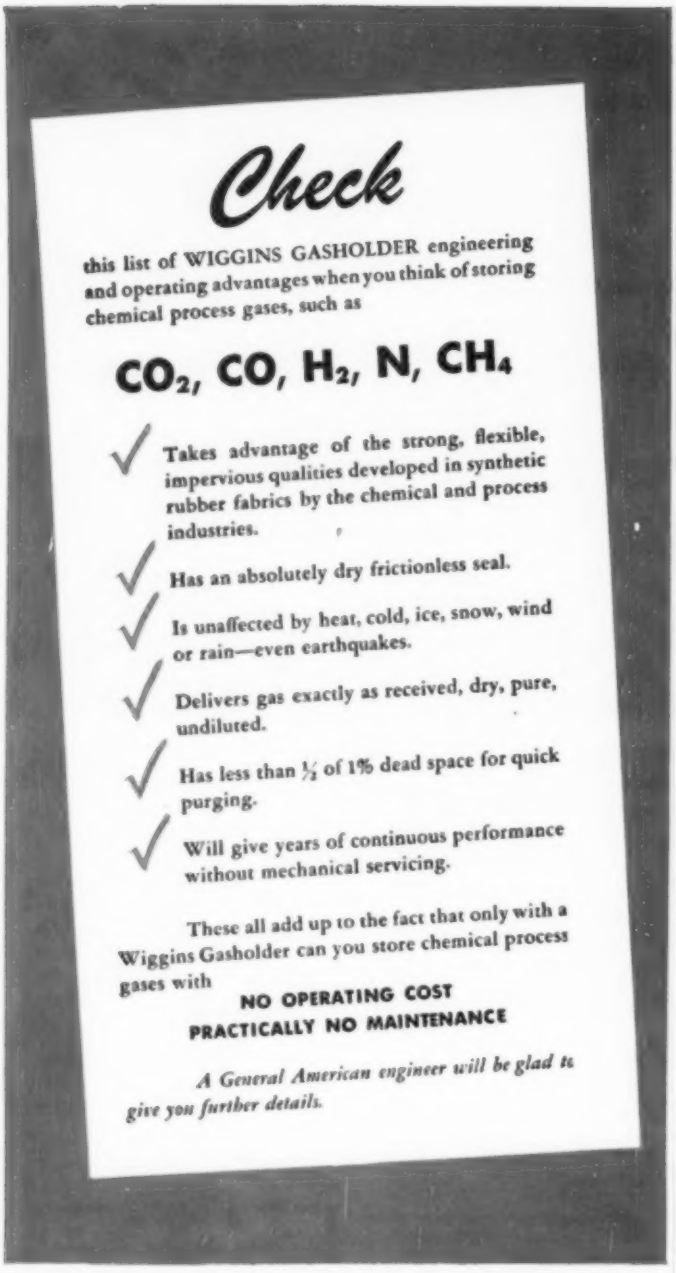
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to be "an outline of the properties of matter and a guide to their systematic interpretation by quantum mechanics." The table of contents illustrates the development of the subject matter: Introduction, The Hydrogen Atom, The Periodic System, Motion and Position of Nuclei in Molecules, Atoms and Molecules in Electric Fields, Van der Waals Attraction Forces, The Chemical Bond, Forces in the Solid State, Magnetic Properties of Matter, Molecular Vibrations, Electronic Spectra, Nuclear Chemistry, State of Matter in Stars.

Quantum mechanics is a rigid mathematical discipline. To make it palatable the authors have tried to popularize it, yet the mathematics contained in the book are probably still complex enough to scare off the less sophisticated reader. There are no references to the literature, which, though it makes for faster travel, still leaves so much to be desired for completeness.

There are a number of baffling peculiarities. The first sentence in the introduction reads as follows: "At present, atomic physical theory in principle enables us to calculate all of the chemical and most of the physical properties of matter and thus makes the science of experimental chemistry superfluous." This, no doubt, puts the poor chemist and chemical engineer in his proper place. He cannot help but feeling rather stupid and "superfluous." However, how happy would he be if somebody could safely predict to him what products to expect say in the nitration of benzaldehyde or in the cleavage of thioesters!

Another baffling point is the translation of "eigen functions" into "proper functions." This reviewer feels that there is nothing proper or improper about them and if translate one must (and why should one) the term "particular functions" would hit much closer to the mark.

Quotations are useful if they illustrate a certain point. It might be fair to the reader to give source, and moreover if it is in a language other than English (Greek in this case) to translate it. How much more embarrassing if a reader should know Greek and would find an error in this quotation, as happens to be the case.

Chemists and chemical engineers generally are not easily impressed. Perhaps there is no need in modern times for a "captatio benevolentiae" (captivation of good will, for the edification of the authors) but one need not antagonize the audience.

To come back to the question of usefulness, the text no doubt has its

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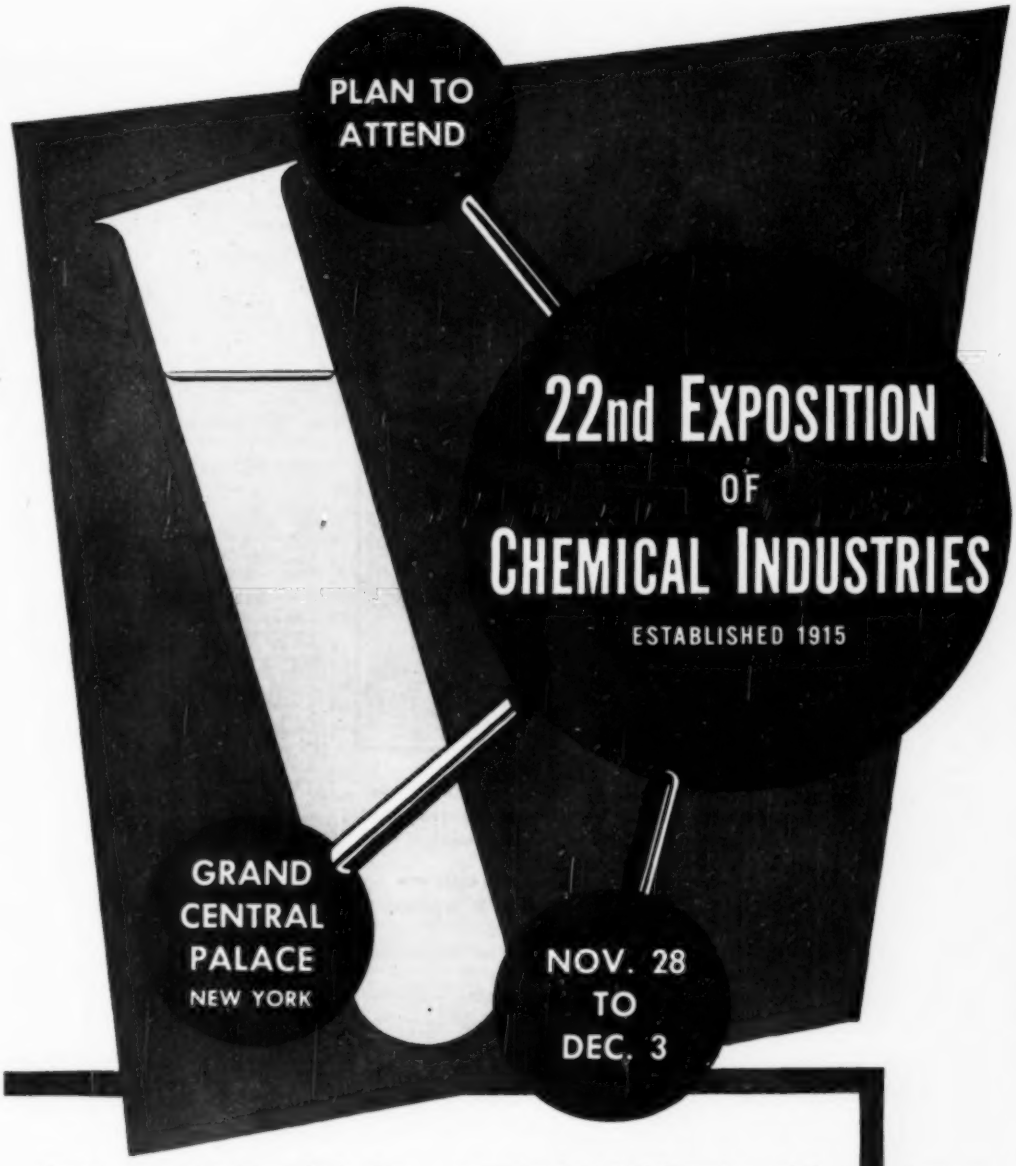

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place in the curriculum of a college or university, probably on the senior or graduate level. The practicing chemist, physical chemist, or chemical engineer will still have to do his tasks the hard way.

Recent Books & Pamphlets

Chemical Engineering Journal. Published by Philippine Institute of Chemical Engineers, 107 Plaza Sta. Cruz, Manila. Foreign subscriptions $5 per year. Vol. I, No. 1 of a new quarterly journal to cover chemical and metallurgical engineering, food and process industries in the Philippines. Felix V. Espino, president of PIChE, is editor.

Public Revenues from Alcoholic Beverages, 1948. Published by Distilled Spirits Institute, Inc., 1137 National Press Bldg., Washington 4, D. C. 63 pages. Compilation of revenues received by federal, state and local governments.

Chlorosulfonic Acid. Chemical Safety Data Sheet SD-33, published by the Manufacturing Chemists' Association, Inc., 246 Woodward Building, Washington 5, D. C. 15 pages. 20 cents. Sets forth physical and chemical properties; usual shipping containers and methods for their unloading and emptying; container storage and handling; and recommended personal protective equipment.

Toxic Eye Hazards. No. 494, published by the National Society for the Prevention of Blindness, Inc., 1790 Broadway, New York. 101 pages. $1. Covers protective equipment and programs for eye protection. Contains tables of toxic chemicals, their effects and symptoms.

Vegetable Oils; Their Production, Processing, and Uses. Published by the American Oil Chemists' Society, 35 East Wacker Dr., Chicago 1, Ill. 187 pages. $4. Proceedings of a six-day short course conducted by the University of Illinois, August 1948. Brings together under one cover authoritative information on the production, processing, and utilization of vegetable oils, information which heretofore has been either unavailable in the literature or found with great difficulty.

Wesley Mitchell and the National Bureau; Record of 1948 and Plans for the Future. By Arthur F. Burns. Published by the National Bureau of Economic Research, Inc., 1819 Broadway, New York 23, N. Y. 107 pages. Part I discusses the life and work of Wesley Mitchell. Part II is the bureau's 29th annual report.

A Professional Guide for Junior Engineers. By William E. Wickenden, as edited by G. Ross Henninger. Published by Engineers' Council for Professional Development, 29 West 39th St., New York 18, N. Y. 55 pages. $1. This booklet sets out to give the beginner some prospective on the engineering profession as a whole so that he may intelligently plan his own career.

New Knowledge Through Scientific Research in Mellon Institute. Published by the Mellon Institute of Industrial Research, 4400 Fifth Ave., Pittsburgh 13, Pa. 39 pages. Gratis. Annual report on the institute's current activities and progress over the past year.

Symposium on Magnetic Testing (1948). Special Technical Publication No. 85, American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. 198 pages. $2.50. The field of magnetic testing and analysis as it exists today with emphasis on more recent developments. Ten papers.

The Hidden Payroll. Economic research study published by Chamber of Commerce of the United States, Washington 6, D. C. 32 pages. 50 cents. Summarizes a survey covering representative private employers of many types and sizes. Identifies non-wage labor costs of doing business which summaries show add typically 15 percent to the direct wage bills in average indus-

(Continued)

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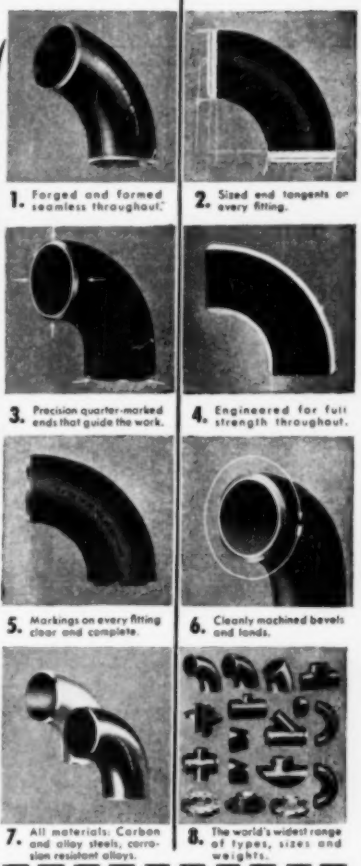

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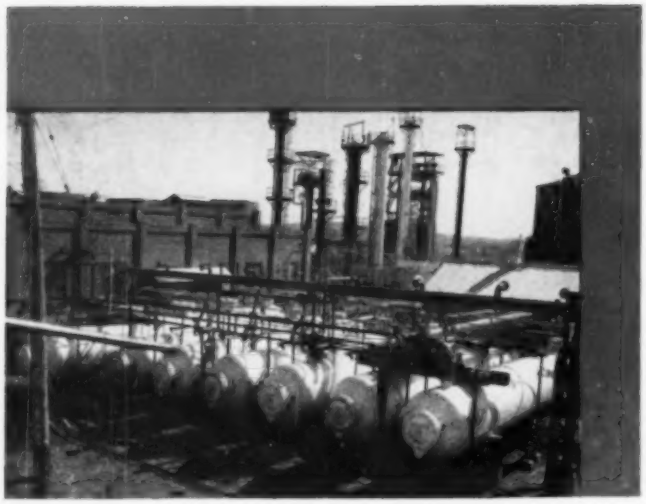

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Mining and Mineral Resources of Missouri. By J. D. Forrester. Technical Series, No. 73, published by School of Mines and Metallurgy, Rolla, Mo. 56 pages. Lists mineral deposits found in Missouri, their location, size, industrial importance, etc.

British Plastics Year Book, 1948. Published by Iliffe and Sons Ltd., Dorset House, Stamford St., London, S.E. 1, England. 478 pages. 30s. Each section is prefaced by a stout tabbed card indexing such subjects as manufactured products, plant and equipment, who's who in the plastic industry, etc.

Steel Plates and Their Fabrication. Published by Lukens Steel Co., Coatesville, Pa. 408 pages. $5. A reference book on plates and plate products for engineers, draftsmen, and fabricators.

Clear the Deck. By Arthur O. England and Harry Laurent, Jr. Published by the National Foremen's Institute, Deep River, Conn. 28 pages. Discussion, with cartoon illustrations, of rules and importance of good housekeeping for plant workers.

Safety Measures in Chemical Laboratories. Published by His Majesty's Stationery Office, York House, Kingsway, London, W. C. 2, England. 22 pages. 20 cents. Contains sections on general laboratory operations and the use of apparatus, fire risks and burns, dermatitis, electrical hazards and shock, poisons, poison gases and treatment of affected persons.

Acrylonitrile. Chemical Safety Data Sheet SD-31, published by Manufacturing Chemists' Association, 246 Woodward Building, Washington, D. C. 17 pages. 20 cents. Important physical and chemical properties of acrylonitrile; its usual shipping containers and methods for their unloading and emptying; container storage and handling, and recommended personal protective equipment.

Les Laitiers Metallurgiques et Leurs Reactions. By E. Eyt. Published by Dunod, 92, Rue Bonaparte (VI), Paris, France. 96 pages. A detailed, practical study of the theory behind slag-metal equilibriums, especially in the molten state.

What Inventions Can Mean to You. Published by the National Association of Manufacturers, 14 West 49th St., New York, N. Y. 68 pages. A seminar made up of five speeches covering research, inventions and patents.

Symposium on Functional Tests for Ball Bearing Greases. Special Technical Publication No. 84, published by the American Society for Testing Materials, 1916 Race St., Philadelphia, Pa. 103 pages. $1.75. Five papers making up a picture of the present status of functional testing of ball-bearing greases.

Properties of Soft Solders and Soldered Joints. By J. McKeown. Research Monograph No. 5, published by British Non-Ferrous Metals Research Association, Euston St., London, N.W.1, England. 140 pages. $4. Describes experimental work done on mechanical properties of tin economy solders and joints made in them.

Proceedings of the First Annual Public Health Engineering Conference. Bulletin Series No. 26, Florida Engineering and Industrial Experiment Station, College of Engineering, University of Florida, Gainesville, Fla. 118 pages. Gratis. Stream sanitation in Florida.

Salaried Job Rating Plan for Accounting Clerical, Supervisory and Technical Positions—and Manual of Procedure. Published by the National Electrical Manufacturers' Association, 155 East 44th St., New York 17, N. Y. 10 and 62 pages respectively. $10 each. The first of these books describes a point job rating plan. The second is a manual of procedure for its use.

Thermodynamic Charts for Combustion Processes. By H. C. Hottel, C. C. Williams, and C. N. Satterfield. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Part I, Text—75 pages. $2.60. Part II, Charts—31 pages. $2.40. The last eight pages in Part II are fold-outs. They are modified air charts and burned-mixture charts.

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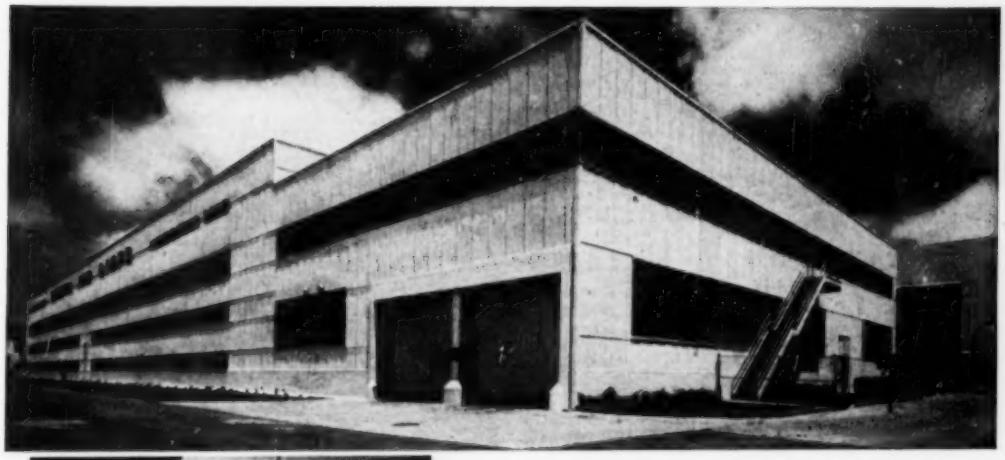

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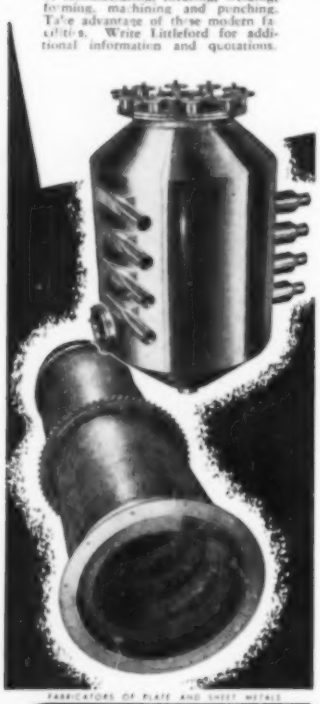

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GOVERNMENT PUBLICATIONS

The following recently issued documents are available at prices indicated from Superintendent of Documents, Government Printing Office, Washington 25, D. C. In ordering publications noted in this list always give complete title and the issuing office. Remittances should be made by postal money order, coupons, or check. Do not send postage stamps. When no price is indicated, pamphlet is free and should be ordered from the Bureau responsible for its issue.

Tennessee Valley. "General Outline of Chemical Engineering Activities." Chemical Engineering Report No. 1. Tennessee Valley Authority. Price 20 cents. The initial number in a series of publications designed to describe the chemical engineering activities of Tennessee Valley Authority of which the first edition was prepared in 1942. It had very limited circulation during the war period. The present revised edition is dated 1948 but appeared for general distributions only during the summer of 1949.

Labor. "Collective Bargaining Provisions." Bureau of Labor Statistics, Bulletin No. 908-10. Price 20 cents. An analysis of illustrations from 160 union contracts of those provisions which deal with union and management cooperation, plant efficiency, and technological change. Operating executives and engineers will find guidance in their local company negotiations and observe precautions both in negotiation and in operations to avoid labor conflicts.

Atomic Energy. "Domestic Control of Atomic Energy; An Experiment In Government." Mimeographed. Unnumbered press release of U. S. Atomic Energy Commission, dated July 22, 1949, based on an address of Commissioner Sumner T. Pike on July 22, 1949. A broad policy review.

Insecticide Dispenser. "Automatic Insecticide-Dispensing Equipment for Installation in Aircraft." By A. H. Yeomans and W. N. Sullivan, Jr. Bureau of Entomology and Plant Quarantine. ET-269. Mimeographed.

German Trade. "Trading With Germany." Office of International Trade, Department of Commerce. Mimeographed. Up-to-date information on trade regulations in effect in Germany.

Power. "Power Market Survey, Missouri River Basin, Area E—Kansas-Missouri, Part I—Power Requirements." Federal Power Commission. F. P. C. P-19. Price $1. Obtain from Publications Division, Federal Power Commission, Washington 25, D. C. A resume of prospective utility and industrial power requirements of the area.

Power. Federal Power Commission memorandum to Senator Saltonstall. Unnumbered mimeographed memorandum released through Senator Saltonstall of Massachusetts available from the Commission. Summarizes New England power requirements of industry and for utility systems.

Trade. "Trade-Agreement Concessions of the United States." U. S. Tariff Commission, Washington, D. C. July 1949. Mimeographed. Statistical compilation bringing together in one place a summary of the rates of duty which are currently applicable as a result of many trade agreement negotiations, arranged by commodities.

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Oleum, concentrated sulphuric, mixed acids and similar liquids, are well within the handling range of Taber Vertical Pumps. Pump can be furnished in all grades of nickel chrome alloys, iron, bronze or carbon steel...whichever customer has found most suitable for their requirements.

For complete information, please write on your letterhead for

TABER SPECIAL BULLETIN V-837

TABER PUMP CO. • Est. 1859 • 294 ELM ST., BUFFALO 3, N. Y.

TABER Higher Practical Performance PUMPS

the problem

Cracking of insulation caused by pipe expansion in high temperature work. Particularly where large pipe sizes are involved, the problem is serious as insulation may crack at practically every joint throughout the length of the pipe. Result: Greatly lowered efficiency and ultimate partial or complete reinsulation of the pipe.

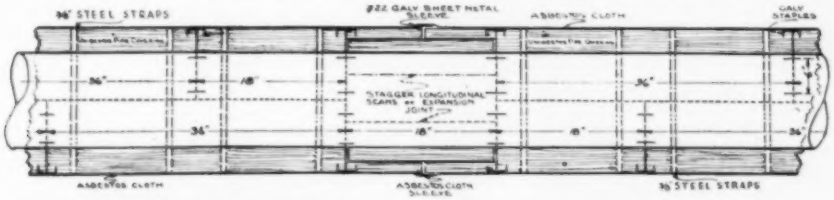
the solution

Application of Unibestos sectional insulation in single-layer construction. Because of the great strength of Unibestos, sections can be readily stapled one to the other on these large pipes, thereby controlling separation of insulation. Separation is confined to one point which is easily covered by an expansion joint made from sectional Unibestos and applied as shown in illustration.

because

1. Unibestos is physically and chemically stable . . . Resists deterioration at high temperature.
2. Unibestos one-layer construction, is quickly applied. Ease of cutting, fitting, stripping, assures substantial savings in application costs.
3. Unibestos has high structural strength. With ordinary handling care on the job or in transit, breakage is exceptionally low.
4. Unibestos is highly resistant to moisture . . . Stands up under repeated water saturation, does not split under steam pressure.
5. Unibestos can be re-used. Easy to remove and replace for pipe inspection and high salvage value on other work.
6. Unibestos with its low thermal conductivity and its high degree of resistance to shock or vibration is the ideal insulation for that *tough* job.

UNARCO **unibestos** is recommended for temperatures up to 1200° F. No. 750 is suitable for temperatures up to 750° F. No. 1200 or Combination are recommended for temperatures up to 1200° F. These temperature ranges permit the use of one material at maximum efficiency for a wide variety of purposes. Unibestos is available in half sections up to 30" pipe diameter, in quadrants up to 60" diameter, and in cylindrical form where specified. No. 750, No. 1200, and Combination are all furnished in single layer construction, but are also available in double layer construction to provide for expansion in piping, where required.



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Couple playpipe to hose line. Every 15 gals. of water and 1 gal. of PYRENE Foam Compound yields 250 gals. of foam! For flammable liquids and ordinary combustibles.

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Eliminates annual recharging. For fires in wood, paper, textiles, and the like. Shoots a steady 40 ft. stream of water or antifreeze solution. 2½ gal. size.

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Your PYRENE jobber can save you time and money!

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Crops. "Agricultural Statistics, 1948." U. S. Department of Agriculture. Price $1.75. A comprehensive compilation assembling in a convenient single volume the large mass of statistical data on farm and agricultural crop conditions, including the latest available figures for 1948, with comparative data for earlier years.

Synthetic Organics. "Synthetic Organic Chemicals—United States Production and Sales, 1948." By Chemical Division, U. S. Tariff Commission, June 1949. Mimeographed. A set of 12 mimeographed leaflets giving the customary preliminary data on production and sale in the U. S. of various classes of synthetic organic chemicals. The leaflets, unnumbered, deal respectively with: tar and tar crudes; crude products from petroleum and natural gas for chemical conversion; intermediates; lakes and toners; medicinals; flavor and perfume materials; plasticizers; surface-active agents; miscellaneous chemicals; plastics materials; coal-tar dyes; rubber-processing chemicals; and elastomers (synthetic rubbers).

Fertilizer. "Nitrogen Fertilizer for American Farmers in 1949-50." A preliminary House Committee Report issued by Sub-Committee on Fertilizer of the Committee on Agriculture, House of Representatives. This gives a resume of findings of this sub-committee based on an extended series of hearings held during March. Includes important policy conclusions which are in effect governing present government action in all departments.

Iron Ore. "Quebec-Labrador as a Future Supply of Iron Ore for the United States." Bureau of Mines, Mineral Trade Notes. Special Supplement No. 29. Mimeographed.

Coal in Brazil. "The Coal Industry of Brazil; Part I." General Economy, Production and Marketing. By J. E. Good, et al. Bureau of Mines, Technical Paper 713. Price 20 cents.

Gasoline. "National Motor-Gasoline Survey, Winter 1948-49." By O. C. Blade. Bureau of Mines, Report of Investigations, R. I. 4567. Mimeographed.

Coal Hydrogenation. "Coal Hydrogenation. The Effect of Variations in the Coal-to-Vehicle Ratio." By Milton Orchin, et al. Bureau of Mines, Report of Investigations, R. I. 4499. Mimeographed.

Explosives. "Report of Research and Technologic Work on Explosives, Explosions, and Flames, Fiscal Years 1947 and 1948." By Bernard Lewis. Bureau of Mines, Report of Investigations, R. I. 4502. Mimeographed.

Fluorite. "Investigation of Jamestown Fluorite Deposits, Boulder County, Colo." By J. H. Hild and E. W. Ames. Bureau of Mines, Report of Investigations, R. I. 4482. Mimeographed.

Tungsten. "Investigation of Henderson Gulch Tungsten Deposit, Granite County, Mont." By R. J. Hundhausen. Bureau of Mines, Report of Investigations, R. I. 4513. Mimeographed.

Chromite. "Investigation of Little Castle Creek Chromite Deposit, Shasta County, Calif." By E. J. Matson. Bureau of Mines, Report of Investigations, R. I. 4516. Mimeographed.

Antimony. "Investigation of Antimony Peak, Kern County, Calif." By G. D. Jermain and S. Ricker. Bureau of Mines, Report of Investigations, R. I. 4505. Mimeographed.

Magnesium. "Investigation of the Thompson Magnesium Well, Grand County, Utah." By C. L. Severy et al. Bureau of Mines, Report of Investigations R. I. 4496. Mimeographed.

Copper. "Investigation of Copper-Bearing Pyrite Ores, Pyriton, Clay County, Ala." By H. D. Pallister and J. R. Thoenen. Bureau of Mines, Report of Investigations R. I. 4494. Mimeographed.

Vermiculite. "Investigation and Laboratory Testing of Vermiculite Deposits, Llano County, Tex." By W. D. McMillan and A. W. Gerhardt. Bureau of Mines, Report of Investigations R. I. 4486. Mimeographed.

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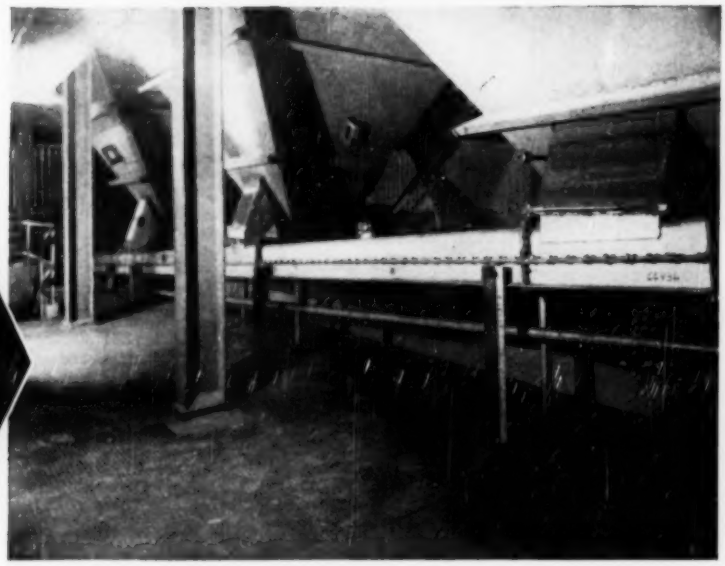

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In this revolutionary type conveyor, dry, fine materials, fluidized with low-pressure air, just flow like water. There are no moving parts to wear or get out of adjustment; consequently, costly labor charges to make repairs and replacements are eliminated. Nothing moves but the air and material. Other major advantages are—extremely low power consumption, no lubrication, no noise, no dust. Simple floor or overhead support releases valuable floor space for other purposes.

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Answer:
Bulletin 175

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Answer:
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Write for the Bulletins that answer your particular corrosion problem... Write for Bulletin No. CHE-R3 for a description of the full scope of General Ceramics' manufacturing and service.

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GOVT. PUBS., *cont.* . .

Report of Petroleum and Natural-Gas Division, Fiscal Year 1945. By R. A. Cattell et al. Bureau of Mines, Information Circular I. C. 7506. Mimeographed.

Report of Petroleum and Natural-Gas Division, Fiscal Year 1946. By R. A. Cattell et al. Bureau of Mines, Information Circular I. C. 7506. Mimeographed.

Concentration of Oxide Manganese Ores from Columbia and Elberta Mining Districts, Tooele and Juab Counties, Utah. By K. C. Dean and K. C. Vincent. Bureau of Mines, Report of Investigations R. I. 4466. Mimeographed.

Investigation of Coyote Creek Antimony Deposits, Garfield County, Utah. By W. M. Traver. Bureau of Mines, Report of Investigations R. I. 4470. Mimeographed.

Investigation of Virgin River Manganese Deposit, Clark County, Nev. By W. H. King, et al. Bureau of Mines, Report of Investigations R. I. 4471. Mimeographed.

Investigation of Silica Deposits near the Skagit River, Skagit County, Wash. By C. C. Popoff. Bureau of Mines, Report of Investigations R. I. 4472. Mimeographed.

Investigation of the Star Mine, Neihart District, Cascade County, Mont. By J. A. Herdlick. Bureau of Mines, Report of Investigations R. I. 4474. Mimeographed.

Investigation of Tungsten Occurrences in Darwin District, Inyo County, Calif. By D. W. Butner. Bureau of Mines, Report of Investigations R. I. 4475. Mimeographed.

Investigation of Sublette Ridge Vanadium Deposit, Lincoln County, Wyo. By P. T. Allsman et al. Bureau of Mines, Report of Investigations R. I. 4476. Mimeographed.

Method of Assaying Oil Shale by a Modified Fischer Retort. (Revision of R. I. 3977). By K. E. Stanfield and I. C. Frost. Bureau of Mines, Report of Investigations R. I. 4477. Mimeographed.

Investigation of the Mohawk Lead-Zinc Mine, San Bernardino County, Calif. By F. J. Wiebelt. Bureau of Mines, Report of Investigations R. I. 4478. Mimeographed.

Investigation of the Waukon Iron Deposit, Allamakee County, Iowa. By P. E. Pearson. Bureau of Mines, Report of Investigations R. I. 4479. Mimeographed.

Diamond Drilling in the Metaline District, Pend Oreille County, Wash. By N. L. Wimmler and W. B. Cole. Bureau of Mines, Report of Investigations R. I. 4481. Mimeographed.

Metallurgical Investigations of the Recovery of Zinc and Iron Sulfides from the Gray Zinc-Iron Deposit, Galena, Ill. By H. Kenworthy. Bureau of Mines, Report of Investigations R. I. 4442. Mimeographed.

Further Investigations of the Redford-Clayburg Magnetite District, Clinton County, N. Y. (Supplement to R. I. 4003). By D. F. Reed and C. J. Cohen. Bureau of Mines, Report of Investigations R. I. 4447. Mimeographed.

Investigation of Pickering Creek Lead-Zinc Deposits, Chester County, Pa. By D. F. Reed. Bureau of Mines, Report of Investigations R. I. 4451. Mimeographed.

Petroleum-Engineering Study of Atlanta Oil Field, Columbia County, Ark. By C. H. Riggs. Bureau of Mines, Report of Investigations R. I. 4455. Mimeographed.

Surface Water Supply of the United States 1946; Part 13: Snake River Basin. Geological Survey Water-Supply Paper 1063. Price 75 cents.

Index of Surface-Water Records; Part 1—North Atlantic Slope Basins. To September 30, 1948. Geological Survey Circular 48. Mimeographed.

Index of Surface-Water Records; Part 9—Colorado River Basin. To September 30, 1948. Geological Survey Circular 45. Mimeographed.

Index of Surface-Water Records; Part 13—Snake River Basin. To September 30, 1948. Geological Survey Circular 47. Mimeographed.

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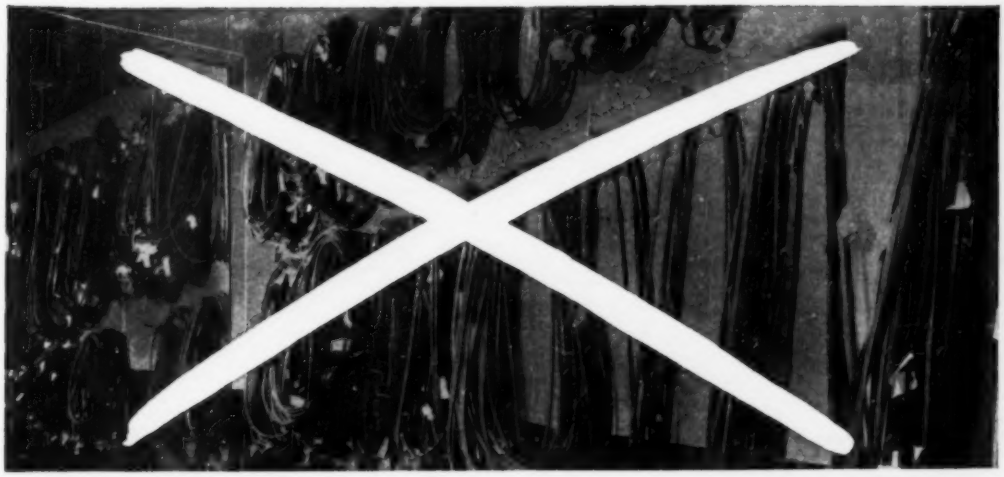

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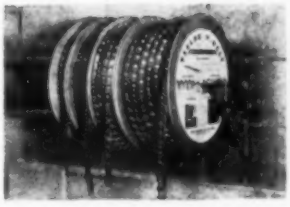
You can replace up to 316 sizes of endless v-belts with just 4 reels of Veelos



From these four reels of Veelos you can make up 316 sizes of O, A, B and C section endless v-belts.

Any length belt can be coupled for quick installation on any drive in a few minutes.

Machine downtime is practically eliminated. Sliding or pivoted motor bases are not needed.

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Veelos on reels saves valuable storage space. It simplifies stock records; it eliminates belt deterioration and obsolescence.

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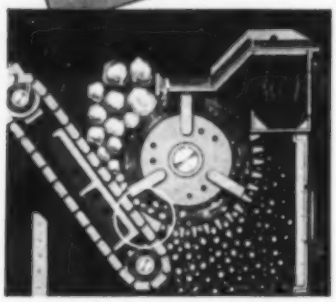

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MANUFACTURERS' LATEST PUBLICATIONS

Publications listed here are available from the manufacturers themselves, without cost unless a price is specifically mentioned. To limit the circulation of their literature to responsible engineers, production men and industrial executives, manufacturers usually specify that requests be made on business letterheads.

Motors. Louis Allis Co., 427 East Stewart St., Milwaukee 7, Wis.—12-page bulletin 611-D illustrates an alternating current, adjustable speed motor. Contains views of construction features of various sizes in the line. Includes performance curves.

Heat Exchangers. Downingtown Iron Works, Inc., Downington, Pa.—16-page booklet lists general facilities, manufacturing equipment, welding procedure qualifications, and standard heat exchanger details. Describes typical plate fabrication and heat exchanger examples.

Water Coolers. Young Radiator Co., Racine, Wis.—16-page Catalog No. 1349 describes a line of water coolers for gas, gasoline, and diesel engine cooling. Contains installation views, dimension and capacity tables.

Carbon Blacks. Godfrey L. Cabot, Inc., 77 Franklin St., Boston 10, Mass.—4 booklets on carbon blacks in various applications. 8-page booklet entitled "Carbon Blacks in Butyl Tube Stocks" contains tables on processing, reinforcement and electrical resistance. 15-page booklet entitled "Evaluation of Carbon Blacks in Natural and Synthetic Rubbers" includes four fold-out charts comparing the effects of blacks on various rubbers. 87-page booklet entitled "Reinforcing Carbon Blacks for Rubber" contains test data on natural rubber, GRS and neoprene. 2-page leaflet describes the use of carbon black in producing jet black polyethylene film.

Chemicals. McKesson & Robbins, Inc., Chemical Division, 155 East 44th St., New York 17, N. Y.—48-page catalog lists chemicals in bulk containers available in less than carload lots. Includes 234 heavy and fine chemicals and 349 botanicals, gums, oils and waxes. Size and kind of shipping containers and principal uses are provided for each entry.

Oil Burners. Hauck Manufacturing Co., 124-126 Tenth St., Brooklyn 15, N. Y.—8-page catalog No. 409 discusses oil burners for manual operation and individual oil and air control. Construction of the burner and its parts is illustrated.

Compressors. Worthington Pump and Machinery Corp., Harrison, N. J.—2 booklets covering compressors made by this company. Bulletin C-1100-B34, 8 pages, describes ammonia booster compressors for refrigeration plants. Completely labeled diagrams of the line are provided along with specifications. Bulletin H-629-B20, 16 pages, covers air cooled compressors and dry vacuum pumps. Models are illustrated and their uses, standard equipment and accessories listed.

Lubricants. Gulf Oil Corp., Division Sales Office, 17 Battery Pl., New York, N. Y.—24-page booklet outlines with photographs the development work being done by this company to improve lubricants.

Soybean Products. Archer-Daniels-Midland Co., 600 Roanoke Bldg., Minneapolis 2, Minn.—16-page booklet entitled "Cracking the Soybean" is a pictorial review of the uses of edible soybean oil.

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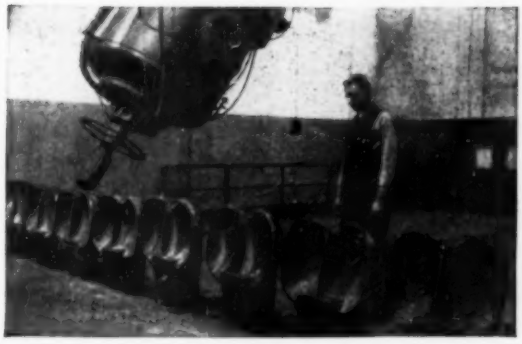

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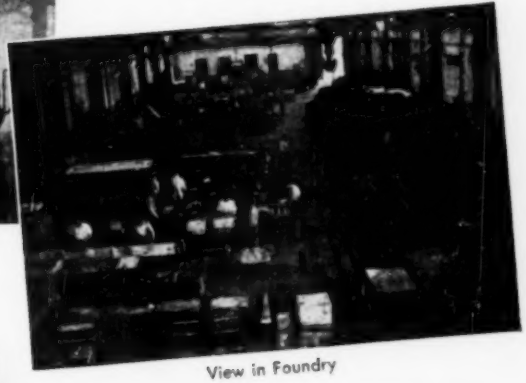

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PROBLEM —Transport Powders by air through a pipe line. Separate dust from the air at the receiving end where headroom is insufficient to accommodate obstructive equipment yet do not spend money for building alterations.

SOLUTION —The pneumatic conveying system was installed with an AIRBORNE Centrifugal Separator designed so compactly that the processor was assured of a smooth working installation in a minimum of space, at lowest initial cost and lowest operating expense.

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AIRBORNE Centrifugal Separators excel in the handling of gases at high temperatures, moisture laden fumes, chemicals known to attack iron and steel (since they can be constructed of corrosion resisting metals), recovery of metallic particles from furnace gases. Sanitary and easy to clean, they have proved invaluable to the Food Processing Industries.

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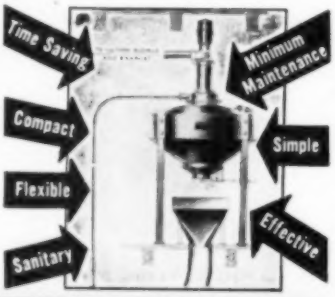

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Mfrs.' Pubs., *cont.*

Engineering Drawings. Timely Products Co., Box 206, Columbus 9, Ohio.—4-page flyer illustrating the set of templates made by this company to aid engineers in making uniform flow symbols faster.

Liquid Level Gages. Penberthy Injector Co., 1242 Holden Ave., Detroit 2, Mich.—72-page Catalog No. 35 covers the line of liquid level and water gages made by this company. Discusses applications and installation of various models.

V-Belts. T. B. Wood's Sons Co., Chambersburg, Pa.—97-page Catalog 192 contains stock drive tables and engineering data. Includes sections on special drives, sheaves and V-belts.

Process Equipment. Allis-Chalmers Manufacturing Co., 1126 South 70th St., Milwaukee, Wis.—2 booklets describe motors and pumps. Bulletin 51B6210B, 8 pages, discusses design and construction features of a line of motors having heavy cast iron frames surrounding all working parts. Bulletin 68B6381C, 8 pages, covers solids pumps for use in the coal, sand, gravel, rock products, cement and paper industries.

Crushers. American Pulverizer Co., 1249 Macklind Ave., St. Louis 10, Mo.—8-page Bulletin No. 147 illustrates the use of this company's hammermills and rolling ring mills for crushing brick, clay, stone and chemicals. Another bulletin, 4 pages, gives capacities, ratings and dimensions of a rotary knife chopper for reducing plastic scrap. Grinders and shredders are described with the use of blueprints and photographs in a third bulletin, 8 pages.

Chemicals. The Matheson Co., Inc., East Rutherford, N. J.—2 bulletins cover fine organic chemicals and compressed gases. The former, List No. 7, contains 16 pages listing the chemicals and their prices. The other leaflet, 8 pages, lists the compressed gases which are available as well as a line of gas regulators made by this company.

Motor Control. Trumbull Electric Manufacturing Co., Plainville, Conn.—22-page Bulletin TEB 8 describes and illustrates the magnetic motor control made by this company.

Antifoams. Dearborn Chemical Co., 310 South Michigan Ave., Chicago 4, Ill.—4-page Bulletin No. 5008 discusses a polyamide antifoam treatment for controlling foaming and conditioning sludge in steam boilers, preventing scale formation in feedlines, closed heaters and economizers.

Process Equipment. Gast Manufacturing Corp., Benton Harbor, Mich.—12-page Bulletin 449 suggesting applications for rotary air motors, compressors and vacuum pumps.

Chemicals. Tennessee Eastman Corp., Kingsport, Tenn.—75-page annual catalog describing a line of chemicals. Specifications, applications and containers are given for each entry.

Sampler. Hardinge Co., Inc., 240 Arch St., York, Pa.—8-page Bulletin No. 47 details operating mechanism and typical installation arrangements for automatic samplers.

Oil Refining. Power-Gas Corp. Ltd., Stockton-on-Tees, England.—16-page brochure No. ORH349 contains a flowsheet showing the edible-oil refining and hardening process used in this plant. Photographs show individual pieces of equipment.

Fatty Acid Esters. W. C. Hardesty Co., 41 East 42nd St., New York 17, N. Y.—two 4-page leaflets set forth in chart form the specifications and respective solubility in oils, solvents and waxes of fatty acid esters.

Furnaces. Burrell Technical Supply Co., 1942 Fifth Ave., Pittsburgh 19, Pa.—two 2-page leaflets describe five models of box and muffle furnaces for low and high temperature operation.

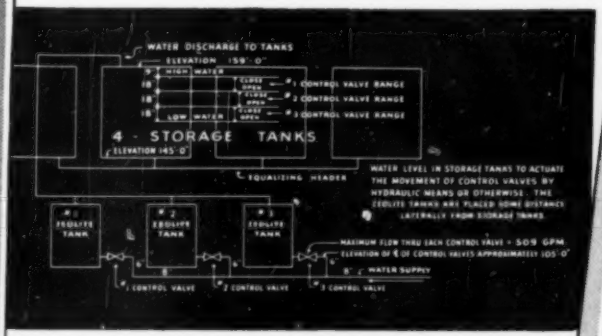
Tanks. National Tank Co., Tulsa, Okla.—16-page booklet illustrating this company's organization and facilities.

Insulation. Owens-Corning Fiberglas Corp., Textile Products Division, 16 East 56th St., New York 22, N. Y.—36-page

(*Continued*)

R-S valvEvents

• EXCERPTS FROM THE R-S BOOK OF EXPERIENCE •


WATER DISCHARGE TO TANKS
ELEVATION 159'-0"
HIGH WATER
LOW WATER
1 CONTROL VALVE RANGE
2 CONTROL VALVE RANGE
3 CONTROL VALVE RANGE
4 - STORAGE TANKS
ELEVATION 145'-0"
EQUALIZING HEADER
WATER LEVEL IN STORAGE TANKS TO ACTUATE THE MOVEMENT OF CONTROL VALVES BY HYDRAULIC MEANS OR OTHERWISE. THE ZEOLITE TANKS ARE PLACED SOME DISTANCE LATERALLY FROM STORAGE TANKS.
#1 ZEOLITE TANK
#2 ZEOLITE TANK
#3 ZEOLITE TANK
MAXIMUM FLOW THRU EACH CONTROL VALVE = 509 GPM
ELEVATION OF ℄ OF CONTROL VALVES APPROXIMATELY 105'-0"
WATER SUPPLY
1 CONTROL VALVE
2 CONTROL VALVE
3 CONTROL VALVE

Automatic Control of Treated Water

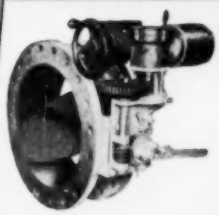
In the above installation, float switches control the three electric motor operated slow acting R-S Valves which maintain a constant supply of treated water in the four storage tanks. The result is simplified performance, minimum pressure drop, unexcelled flow characteristics and reduced maintenance.

Similar applications of power operated R-S Valves can be equipped with air diaphragm, oil or hydraulic cylinders for the control and shut-off of a multitude of materials. They are used advantageously to reduce, regulate and shut off pressure whether above or below atmosphere; to control liquid level; to relieve and control back pressure; to maintain a constant differential pressure; to control rate of flow; to control combustion, and govern the output of pumps, fans, engines and turbines.

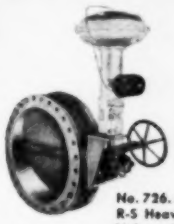
R-S Valves are precision engineered, metallurgically and mechanically. Adapted to elevated or sub-zero temperatures . . . 15 to 900 psi.

Consult with your local R-S representative. Look for the address and phone number listed under "R-S Products Corporation, Valves" or write direct.

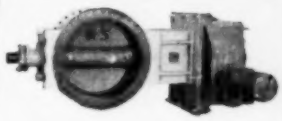
R-S PRODUCTS CORPORATION
Wayne Junction • Philadelphia 44, Pa.



No. 617. Float Switch Electric Motor Control for slow acting R-S Valve. Hand wheel for manual operation on gear reduction drive. Extended lever for operating sister valve in parallel line.



No. 726. 30-inch R-S Heavy Duty Valve with 125-pound American Standard flanges, steel diaphragm top and positioner, hand wheel control with declutching mechanism and outboard gooseneck bearing on operating shaft.



No. 658. 42-inch R-S Heavy Duty "H" Metal 125-pound Valve for high pressure and flow. Opens or closes completely in one second requiring 38,000 pounds torque.

No. 755. R-S Pipeline Shock Absorbers (four models) eliminate shock and hammering in pipe lines carrying liquids of any nature. No moving parts . . . easily installed in any position.

for your *UP-FIRED* Petroleum Heaters, use . . .

"AIROCOOL" OIL-GAS TANDEM COMBUSTION UNITS

NATIONAL AIROIL FUEL OIL GAS BURNERS

The above photo shows a group of four NATIONAL AIROIL TANDEM COMBUSTION UNITS, recently installed in a large Pennsylvania refinery. The burners are located at the Petro-Chem Furnace of the Vacuum Distillation Unit in this refinery. Although the installation was one of special application, "National Airoil" TANDEM UNITS very readily "fitted into the picture" with no trouble and a minimum of cost. This is because "AIROCOOL" TANDEM COMBUSTION UNITS are also designed for firing vertically upward, as shown, and are easily applied to all types of process furnaces.

The TANDEM UNIT maintains a high flame temperature with either fuel oil or gas; can be brought quickly to full capacity with a clean flame; and flame can be regulated and directed to uniformly radiate heat to the absorbing surfaces without flame impingement.

For complete details about the TANDEM COMBUSTION UNIT and the various types available, write

OIL BURNERS and GAS BURNERS for industrial power, process and heating purposes; STEAM ATOMIZING OIL BURNERS; MOTOR-DRIVEN ROTARY OIL BURNERS; MECHANICAL PRESSURE ATOMIZING OIL BURNERS; LOW AIR PRESSURE OIL BURNERS; GAS BURNERS; COMBINATION GAS and OIL BURNERS; AUTOMATIC OIL BURNERS, for small process furnaces and heating plants; FUEL OIL HEATERS; FUEL OIL PUMPING and HEATING UNITS; FURNACE RELIEF DOORS; AIR INTAKE DOORS; OBSERVATION PORTS; SPECIAL REFRACTORY SHAPES.

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Main Offices & Factory: 1235 EAST SEDGLEY AVENUE, PHILADELPHIA 34, PA.
Texas Office: 2512 South Boulevard, Houston 6

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MFRS.' PUBS., cont. . .

manual covers glass-base electrical insulating materials. Photographs, charts and tables describe types of materials and properties. Comparative test data is included.

High Vacuum Equipment. Central Scientific Co., Department HJ, 1700 Irving Park Road, Chicago 13, Ill.—48-page bulletin contains data on high vacuum pumps and accessory apparatus, systems, connection and pumping speeds.

Materials Handling. Barrett-Cravens Co., 4613 South Western Blvd., Chicago 9, Ill.—8-page Bulletin No. 4861 illustrates the electric lift trucks, pallets and tractors made by this company.

Motors. Electric Machinery Manufacturing Co., Minneapolis 13, Minn.—32-page booklet covers basic theory, operation, characteristics and applications, and control of large induction motors. Fully illustrated with graphs, cutaway drawings and photographs.

Packaging. Acme Steel Co., 2840 Archer Ave., Chicago 8, Ill.—10-page Issue No. 23 explains the use of this company's steel equipment in packaging departments.

Construction Materials. Fischer & Porter Co., 97 County Line Road, Hatboro, Pa.—4-page Catalog Section 97 tabulates corrosion-resistant materials for over 300 liquids and gases for use in flowrater instruments.

Heaters. Peabody Engineering Corp., 580 Fifth Ave., New York 19, N. Y.—6-page Bulletin No. 600 discusses typical applications and operating data on direct fired air heaters. Includes flow charts and cross-sectional drawings.

Valves. Cooper Alloy Foundry Co., Hillside, N. J.—4-page leaflet contains drawings comparing four valves made by this company. Another 4-page leaflet shows sketches of the valves with their parts clearly labeled.

Pumps. Marlow Pumps, Ridgewood, N. J.—12-page Bulletin IB49 describes and illustrates self-priming centrifugal pumps. Compares the various models and contains views of typical applications.

Resins. Hercules Powder Co., Synthetics Department, Wilmington 99, Del.—two 1-page charts list available synthetic resins and their properties. One chart lists solutions only while the other includes both solids and solutions.

Conveyors. Lake Shore Engineering Co., Conveyor Division, Iron Mountain, Mich.—8-page Catalog No. 495 illustrates the uses of a portable power conveyor for handling bulk materials and packaged goods.

Sodium. National Distillers Chemical Corp., Department A, 120 Broadway, New York 6, N. Y.—50-page booklet on the reactions and industrial uses of sodium. Covers history, handling and storage and properties.

Water Conditioning. Infilco Inc., 325 West 25th Pl., Chicago 16, Ill.—28-page Bulletin 1825 describes construction and operation of this company's water treating machinery. Shows how the machinery is used in various industries.

Glycol Ethers. Dow Chemical Co., Midland, Mich.—42-page booklet contains physical and use data on glycol ethers. Includes 20 pages of graphs covering vapor pressures, densities, viscosities, vapor-liquid equilibriums etc.

Heat Transfer. Patterson-Kelley Co., Inc., East Stroudsburg, Pa.—4-page booklet is made up of sketches of heat transfer equipment such as kettles, heat exchangers, instantaneous heaters, condensers and coolers.

Materials Handling. Barrett-Cravens Co., 4609 South Western Blvd., Chicago 9, Ill.—4-page Bulletin 4881 catalogs supplementary materials handling equipment such as barrel trucks, reel trucks, carboy pourers, and die tables.

Pumps. Johnston Pump Co., 2324 East 49th St., Los Angeles 11, Calif.—8-page Bulletin 1013 treats oil lubricated pumps; 8-page Bulletin 1014 treats water lubri-

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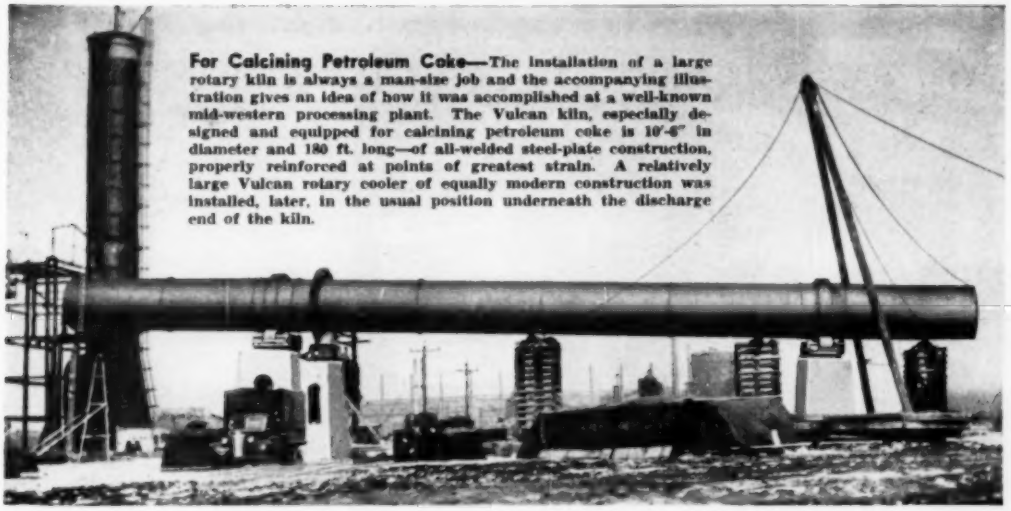


For Calcining Petroleum Coke—The installation of a large rotary kiln is always a man-size job and the accompanying illustration gives an idea of how it was accomplished at a well-known mid-western processing plant. The Vulcan kiln, especially designed and equipped for calcining petroleum coke is 10'-6" in diameter and 180 ft. long—of all-welded steel-plate construction, properly reinforced at points of greatest strain. A relatively large Vulcan rotary cooler of equally modern construction was installed, later, in the usual position underneath the discharge end of the kiln.

Vulcan Rotary Kilns are backed by a

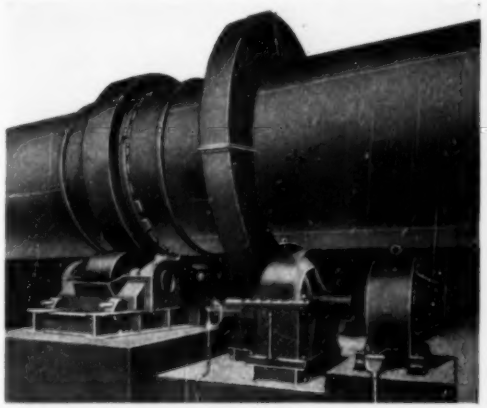
HUNDRED YEARS

of Successful Manufacturing Experience

Not many manufacturing companies in this country have operated continuously and successfully for a hundred years. That the Vulcan Iron Works has achieved this distinction is, in itself, an indication of uniformly high standards in both the design and construction of its many products for users of heavy industrial equipment.

For more than fifty years we have furnished a constantly increasing variety of Rotary Kilns, Coolers, Dryers, Retorts, etc., to the rock products, metallurgical and chemical processing industries; practically all of which have been designed and built especially to meet the purchaser's specific requirements. The experience thereby acquired is always at the disposal of prospective purchasers and often enables us to make money-saving suggestions without charge or obligation.

Write us regarding any processing requirement to which a rotary cylinder of any size or type might be applied. Our engineers welcome opportunities to cooperate with other engineers, or production executives, in developing designs that assure maximum efficiency at lowest ultimate expense.



Driving mechanism for Vulcan rotary kiln. Cast-steel gear ring and main pinion have machine-cut teeth and are completely enclosed in an oil-tight safety guard. Motor-driven speed-reducer drive unit is fully enclosed and operates in an oil bath.

Vulcan Iron Works

Established 1849

WILKES-BARRE, PA., U.S.A.

Cable Address "Vulworks Wilkes-Barre"

Other Vulcan Products include Industrial Locomotives, Electric Hoists, Mining Machinery, Sugar-Mill Machinery, Heavy Special Machinery

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NO SCORE for centrifugals in any inning . . . when you pack with PALMETTO PALCO®!
On centrifugals pumping water or handling any neutral fluid to 275 F, there's no chance of scoring pump sleeves if the packing is Palmetto Palco.
Palco won't score because it can't score. Built of cotton roving, each strand is separately saturated with a Palmetto lubricant that provides a self-lubricating packing. Friction created is negligible.
Available in coil or ring . . . plaited square to required sizes. Write today for full particulars on this and the full line of Palmetto packings for all industry.
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Contact your Palmetto distributor on packing problems . . . ask him about our special tools.

MFRS.' PUBS., *cont.* . .

cated pumps. Both contain a large cutaway drawing with the internal mechanism of the pumps clearly labeled.

Plasticizers. Monsanto Chemical Co., Development Department, Organic Chemicals Division, St. Louis 4, Mo.—12-page Bulletin O-D-113 contains 22 plasticized polyvinyl chloride formulations. Outstanding properties of each are given.

Rigid Frame Buildings. McCloskey Co. of Pittsburgh, 3400 Liberty Ave., Pittsburgh 1, Pa.—8-page booklet illustrates and describes this company's Rigidsteel design principal for building construction.

Clipping Service. R. H. Bacon & Co., 343 South Dearborn St., Chicago 4, Ill.—8-page booklet No. 50 outlines a service useful for checking publicity, competitive advertising and publicity, and finding sales prospects.

Strainers. Elliot Co., Jeannette, Pa.—12-page Bulletin A-13 illustrates and describes a line of twin strainers. Includes a presure drop curve. Dimensions of all types and sizes are given.

Valves. Kennedy Valve Manufacturing Co., Elmira, N. Y.—12-page pocket-sized Circular 101 describes bronze globe and angle valves with renewable composition discs. Contains a table of available sizes and dimensions and a sectional drawing of the valve showing construction features.

Amino Acids. Dow Chemical Co., Midland, Mich.—32-page booklet on the essential amino acid, methionine. Covers the present status of research on the chemical. Discusses its medicinal and nutritional value. 16-page booklet does the same for tryptophan, another amino acid.

Vacuum Evaporation. Distillation Products, Inc., 755 Ridge Road West, Rochester 13, N. Y.—12-page booklet entitled "Vaporized Metal-Coatings by High Vacuum" includes a table listing the characteristics of various vacuum coating units. Gives space requirements, approximate shipping weight, evacuation speed and approximate ultimate vacuum.

Steel Tubing. Babcock & Wilcox Co., Beaver Falls, Pa.—Bulletin TA 1517 covers stainless steel tubing for the food processing industry. Concerns tubing and pipe for conveying lines or heat transfer units.

Insecticides. Hercules Powder Co., Wilmington, Del.—Three 4-page pocket-sized folders discuss recommendations about toxaphene for the control of peanut insects, the army worm and sugar beet webworms.

Aluminum. Reynolds Metals Co., 2500 South Third St., Louisville, Ky.—116-page hand book contains chapters on figuring tensile stresses, compressive stresses, bending stresses and shear stresses to aid the engineer in designing aluminum structures. Formulas and actual examples are included.

Filters. Niagara Filter Corp., Buffalo, N. Y.—16-page bulletin describes construction, design, operation and application of pressure-leaf filters.

Safety. Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.—4-page Bulletin No. CN-3 illustrates face shields for protection in handling acids and other chemicals, pouring hot metal, etc.

Nonyl Phenol. Koppers Co., Inc., Chemical Division, Koppers Bldg., Pittsburgh 19, Pa.—15-page Bulletin C-8-125 describes properties, chemical reactions and uses of nonyl phenol, an alkylated phenol.

Capacity Calculator. Hammond Iron Works, 630 Fifth Ave., New York 20, N. Y. —Slide rule type calculator shows storage tank capacity in gallons and cubic feet in tanks of from 10 to 100 ft. in height and from 20 to 120 ft. in diameter.

Paint. Speco, Inc., 7308 Associate Ave., Cleveland 9, Ohio.—1-page flyer describes the uses of an anti-rust paint.

Esters. Glyco Products Co., Inc., 26 Court St., Brooklyn 2, N. Y.—24-page brochure

(*Continued*)

Steam (or coolant)
CAN DO MORE FOR YOU
...this way
JACKETED
The narrow passage forces high speed circulation and positive scavenging.
STEEL
The thinner section assures that heat is transferred rapidly and uniformly.

Lukenweld Jacketed Steel Rolls, operating under the same conditions as old style rolls, do more work and produce finer products—proved in dozens of plants and on many different processes. And, where steam pressures were raised, production increases of over 60% have been reported.

The welded steel plate construction of Lukenweld Rolls permits high pressures to be employed with safety. It also assures more uniform and faster heat transfer, whether the job is moving heat into or out of your product.

Lukenweld engineers will help select the rolls you need, then design and even build the machine section or complete unit. For a copy of Bulletin 358, giving more information on Lukenweld Rolls, and for this other help, write Lukenweld, Division of Lukens Steel Company, 400 Lukens Building, Coatesville, Pennsylvania.

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• For water when you need it, you can't beat an elevated tank. Backed by 85 years' experience in tank design and fabrication, you can rely on COLE tanks to more than meet insurance requirements and ASME standards, and to provide you with an extra margin of safety.

Whether you desire a tank of 5,000 or 2,000,000 gallons—Cole engineers will give you the *right* design for the specifications. Write for the latest Cole catalog—"Tank Talk."

R. D. COLE
MANUFACTURING CO.
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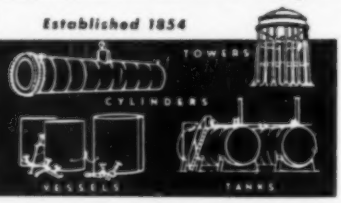

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AN AGENCY OF THE STATE OF OKLAHOMA

MFRS.' PUBS., cont. . .

gives tables of physical properties and uses of higher fatty acid esters and esters of glycerol, glycols and polyglycols.

Heaters. Foster Wheeler Corp., 165 Broadway, New York 6, N. Y.—4-page folder describes a verticle tubular heater. Diagram shows the use of bare tubes and the absence of metal parts exposed to furnace gases.

Water Vapor. Pittsburgh Lectrodryer Corp., P. O. Box 1766, Pittsburgh 30, Pa. —"The World Is Sopping Wet" is on the fundamental physics of water vapor as related to solid adsorption dehumidification.

Plastics. American Cyanamid Co., Plastics Dept., 30 Rockefeller Plaza, New York 20, N. Y.—12-page brochure gives properties and uses of the line of molding materials and resins made by this company.

Conveyors. B. F. Goodrich Co., Akron, Ohio.—4-page leaflet illustrates the uses of this company's line of conveyor belts which cut down sliding. The belt surface is made to grip material and allow transportation up high angles of incline.

Instruments. Schutte and Koerting Co., Advertising Dept., 12th and Thompson Sts., Philadelphia 22, Pa.—12-page Bulletin 15-RC describes this company's line of recording and controlling rotameters. Photographs and cut-away views show construction and operation.

Strain Gages. Baldwin Locomotive Works, Testing Equipment Dept., Philadelphia 42, Pa.—4-page Bulletin 279 illustrates some of the uses of the bonded resistance wire strain gages made by this company.

Alkyd Resins. Alkydol Laboratories, Inc., 3242 South Fiftieth Ave., Cicero 50, Ill.—Four 2-page bulletins covering this company's line of liquid flatted alkyd resins for paints and enamels. Applications and properties are discussed.

Petroleum Sulphonates. Pennsylvania Refining Co., 2686 Lisbon Rd., Cleveland 4, Ohio.—6-page folder covers the composition and uses of the line of petroleum sulphonates produced by this company. Emphasis is placed on their use as surface active agents.

Liquids Soaps. West Disinfecting Co., 42-16 West St., Long Island City 1, N. Y.—16 page booklet describes this company's soaps and functional soap dispensing equipment. Illustrated with photographs and schematic diagrams.

Plastic Fabricating Machine. Taber Instrument Corp., 105 Goundry St., North Tonawanda, N. Y.—6-page bulletin pictures and gives the operating ranges of the line of plastic fabricating machines made by this company. Illustrates the types of products which may be made with the machines.

Rubber Hose. B. F. Goodrich Co., Akron, Ohio.—Two 4-page leaflets describing types of rubber hose made by this company. Bulletin 4800 covers water hose; Bulletin 4030 covers hydraulic control hose.

Process Equipment. National Carbon Co., Inc., 30 East 42nd St., New York 17, N. Y. —Catalog Section M-8806A describes this company's equipment and system for production of cool dilute sulphuric acid.

Agitators. Mixing Equipment Co., 1024 Garson Ave., Rochester 9, N. Y.— Describes turbine agitator made by this company. Also contains details on company's mixer drive and various impeller types as well as specifications of the complete unit.

Instruments. Photoswitch, Inc., 77 Broadway, Cambridge 42, Mass.—Bulletin PA 494 outlines the working of this company's photoelectric control instrument for indicating a jam on a conveyor.

Wire Cloth. Cambridge Wire Cloth Co., Cambridge, Md.—85-page catalog contains specifications, descriptions and illustrations of this company's line of meshes, weaves, metals and alloys.

Fluids and Lubricants. Carbide and Carbon Chemicals Corp., 30 East 42nd St., New York 17, N. Y.—28-page Form 6506 covers the uses of polyalkylene glycols.

(*Continued*)

Zinc Chloride

FOR USE IN—Preserving wood; Finishing paper and textiles; Flameproofing and dyeing textiles; Galvanizing; Manufacturing vulcanized fibre, batteries and glue.

Zinc Sulphate

FOR USE IN—Fertilizers and orchard sprays; dyeing and printing textiles; Electro plating; Electro galvanizing; making rayon, paint, varnish, glue.

At Wheatland, Pa., Maneely Chemical Company has one of the most efficient, modernly equipped chemical plants in the country.

Glass lined vats and equipment and a new process combine to give a new high in uniformity, purity and quality.

Maneely CHEMICAL COMPANY

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Plant, Wheatland, Pa.

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Industrial safety is not automatic, but our Automatic Valves offer you the fruits of 25 years' sucessful experience in designing and manufacturing valves.

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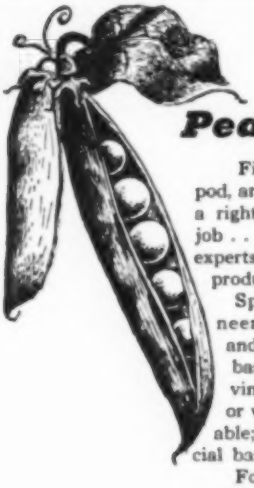

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Sperry's experienced engineers can both recommend and furnish the proper filter base you require. Paper, cloth, vinyon, asbestos, rubber, glass, or woven metals are all available; and in special cases, special bases are designed.

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MFRS.' PUBS., cont. . .

and derivatives. Tables and graphs show properties and their effects on the use of the glycols as lubricants, hydraulic fluids, plasticizers, etc.

Dryers. C. M. Kemp Mfg. Co., Baltimore, Md.—30-page Catalog D-37 discusses desiccant-bed drying of air, gases and liquids. General operation of a dryer is covered by cut-away drawings showing the drying cycle.

Chemicals. Harshaw Chemical Co., 1945 East 97 St., Cleveland 6, Ohio.—32-page report describing the divisions of this company and the chemicals produced by each division.

Motors. Century Electric Co., 1806 Pine St., St. Louis 3, Mo.—8-page form 942 illustrates the operating features and applications of the induction motors made by this company. Contains fully labeled cross-sectional drawing of motor.

Chemical Equipment. Maurice A. Knight Co., Kelly Ave., Akron 6, Ohio.—4-page leaflet describes the line of fume washers for corrosive service made by this company. Gives details on construction and operating principles.

Carbon Blacks. Godfrey L. Cabot, Inc., 77 Franklin St., Boston 10, Mass.—Two booklets discuss this company's carbon blacks. The first, Vol. II, No. 5, entitled "Electrical Conductivity Study" contains 12 pages. Graphs and tables show how electrical resistance in various rubbers changes with carbon black content. Vol. II, No. 6, 16 pages, covers pigments.

Valves. Edward Valves, Inc., East Chicago, Ind.—Catalog 12-H covers this company's cast steel valve designs with pressure-seal bonnets. Gives design details, material specifications, pressure-temperature ratings etc.

Process Equipment. Allis-Chalmers Mfg. Co., 1147 South 70th St., Milwaukee, Wis.—6-page Bulletin 07B7221 describes this company's car shaker for speeding up unloading of drop-bottom gondola cars. Includes construction features, installation data and specifications.

Surface Finishes. Reynolds Metals Co., 2500 South Third St., Louisville, Ky.—124-page booklet entitled "Finishes For Aluminum." Furnishes information on processes for applying surface finishes to aluminum, as well as the characteristics of the finishes so produced.

Plastics. E. I. du Pont de Nemours & Co., Inc., Plastics Dept., 350 Fifth Ave., New York 1, N. Y.—4-page leaflet describing and charting the properties of this company's acrylic resin molding powder.

Plastics. M. W. Kellogg Co., Chemical Manufacturing Division, P. O. Box 149, Jersey City 3, N. J.—Three bulletins describing this company's thermoplastic. No. 1-1-49 contains 4 pages of tables, graphs and text on physical and mechanical properties. No. 2-1-49, a 2-page bulletin, is concerned with various molding techniques. Bulletin 3-1-49, 7 pages, covers specific thermal treatment for varying the physical properties of the molded material.

Fatty Acids. Archer-Daniels-Midland Co., 660 Roanoke Bldg., Minneapolis 2, Minn.—Bulletin 77 is a 6-page cardboard folder charting constants and compositions of commercially available fatty acids.

Welding Alloys. All-State Welding Alloys Co., Inc., 273 Ferris Ave., White Plains, N. Y.—32-page pocket-sized catalog lists this company's rods, fluxes, etc. Contains tables of characteristics and application data.

Electrical Instruments. James G. Biddle Co., 1316 Arch St., Philadelphia 7, Pa.—8-page Bulletin 21-05-61 provides a chart to simplify choosing the correct insulation resistance tester from this company's line.

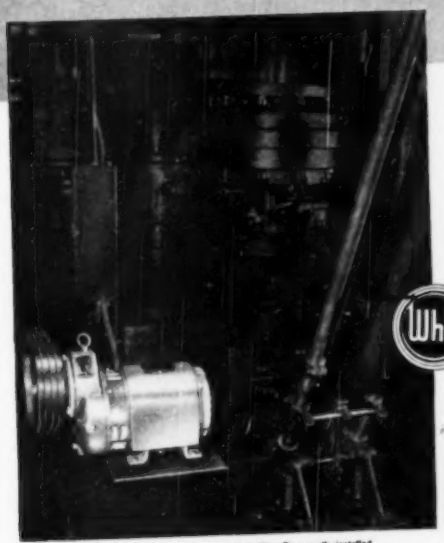
Die Casting. New Jersey Zinc Co., 160 Front St., New York 7, N. Y.—4-page leaflet describes the promotional material on die casting that this company has available.

Instruments. Aerovox Corp., New Bedford, Mass.—Illustrated folder on the capacitance and resistance bridge made by this company.

—End

2 MORE Nationally Known Firms

WHO USE THE Philadelphia GEARMOTOR



Above: Showing one of four 3 H.P. Philadelphia GearMotoRs recently installed by the R. M. Hollingshead Corp., Camden, N. J. Motor speed—1750 R.P.M.; output speed—350 R.P.M.; Reduction ratio is 5:1. Driving a square can seamer.

Above: Showing one of two 1 H.P. Philadelphia GearMotoRs installed in the Front Royal Plant of American Viscose Corp. Motor Speed—1750 R.P.M.; output speed—125 R.P.M.; Reduction ratio is 15:1.

Here are some of the reasons why the **Philadelphia GearMotoR** is being used by hundreds of companies throughout industry: It is a self-contained, extremely compact unit that conforms to recommended standards of A.G.M.A. and N.E.M.A.; it is available in single, double and triple reductions . . . and the range of speeds run from 780 through 7.5 R.P.M.; motor rating from 1 H.P. through 60 H.P. . . . A-c or D-c. Motors are precision-built and fit perfectly with gear unit. Gears are of the helical type, long-lived and quiet in operation; made of quality alloy steel, precision machined (teeth shaved) and induction-hardened. Assembly is very simple: Motor and gear units are each self-contained, yet readily separated; gears in multi-reduction units may be inspected without uncoupling from driven machine. Lubrication is of the positive "splash type," with large reservoir. Gear housing is leak-proof, and motor, which is greased independently, has double-shielded ball bearing design.

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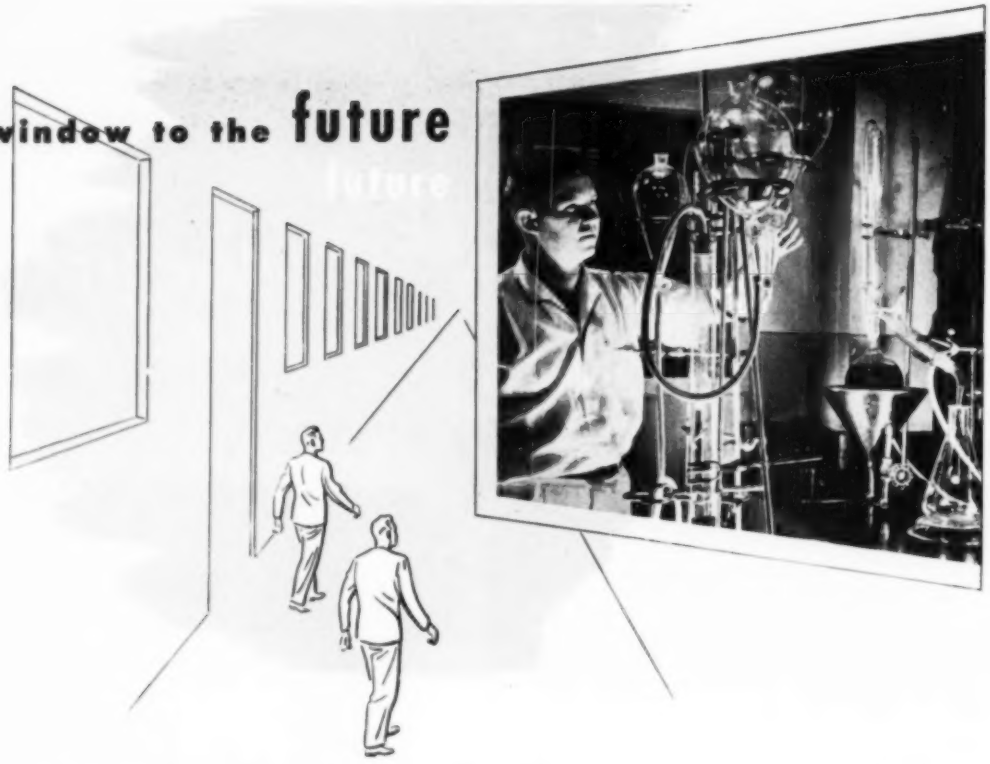

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Chemical Economics

RICHARD F. WARREN, Assistant Editor

Chemical Consumption is Down From 1948 Rates But is Running Ahead of Wartime Levels

Like other segments of U. S. business, the chemical process industries are moving through a period of readjustment. One measure of the magnitude of this readjustment is the relative demand for chemicals in the various process industries.

At the present time industrial chemical consumption is about 5 percent below the corresponding 1948 period. This is about the same level reached in 1947—far above any war or prewar records. The annual 1949 rate will be only slightly lower.

Where has the drop occurred? From a study of the accompanying table it can be seen that the pulp and paper industry is slightly below the 1947 rate of operation. The glass industry is operating at 89 percent of the 1948 rate. The paint, varnish and lacquer industry is also down slightly.

Despite the sharp break in rayon operations in the first half of 1949, chemical consumption in this important industry is only slightly below the 1947 operating rate. However, textiles as a whole show a 2-point dip in chemical consumption as measured by the *Chemical Engineering* Index.

Leather, industrial explosives, and rubber are also down slightly from the 1947 rate.

On the other hand, fertilizers, petroleum refining, iron and steel, coal products and plastics are using more chemicals today than they did in 1947.

New construction, another barometer of chemical engineering activity, is continuing at a high rate. Chemical firms are now spending at the rate of $1.4-billion for new plants and equipment. Vast new projects include National Distiller's new $10-million plant in Ashtabula to make sodium and chlorine and Hooker-Detrex's adjoining $1.5 million unit to produce trichlorethylene. Du Pont is erecting new nylon salt facilities in Texas. Dow is building another million-dollar plant at Freeport. Colgate-Palmolive-Peet plans to erect a $2-million plant at Kansas City, Kans. Out in Wyoming, Texas Gulf Sulphur is constructing a $3-million sulphur recovery unit. Freeport Sulphur is building a 40 ton per day recovery unit in New Jersey. In Philadelphia Du Pont is planning to build another $2-million research laboratory. Four petroleum firms are spending $90 million on new facilities in this area. These represent only a few of the new plant expansions recently announced or now under construction in the chemical process industries.

All this adds up to a good twelve months for the CPI, but 1948, for a while at least, will remain the record postwar year. Production rates are picking up again in a seasonal movement as we go to press. If no major break in our national economy occurs, 1950 should equal or surpass 1949 levels of consumption in the vital and evergrowing chemical process industries.

According to the National Fertilizer Association fertilizer exports and imports were up in the first six months of 1949 when compared with the first half of 1948. Exports of nitrogen and potassium type created the increase. Phosphate exports were 80,000 short tons below the six-month 1948 period.

Chemical Engineering's Index for Industrial Consumption of Chemicals

1935 = 100

Industries	1939	1941	1943	1944	1945	1946	1947	1948	1949*
Fertilizers	25.13	31.49	40.12	39.76	42.21	44.85	51.15	53.10	55.96
Pulp and Paper	16.52	19.98	19.05	18.87	19.44	21.47	22.62	23.70	22.25
Glass	12.51	15.03	18.80	19.93	19.64	21.71	21.77	19.75	17.46
Petroleum	13.45	15.20	15.56	18.10	18.71	18.82	20.03	21.75	21.56
Paint, Varnish and Lacquers	10.66	15.03	15.40	16.71	17.37	21.27	23.85	24.25	22.58
Iron and Steel	8.21	12.88	13.49	13.33	11.96	10.20	13.01	13.41	14.49
Rayon	9.08	12.87	15.53	16.81	18.38	19.89	22.69	26.56	22.39
Textiles	7.80	11.08	11.43	10.53	10.30	11.15	11.07	10.82	8.94
Coal Products	7.17	9.28	9.47	10.05	9.41	7.96	10.25	10.13	10.82
Leather	4.16	4.88	4.86	4.25	4.54	4.60	4.75	4.30	4.31
Industrial Explosives	4.53	5.54	5.52	5.06	5.36	6.29	7.40	8.11	7.17
Rubber	2.79	3.91	3.00	3.00	4.55	6.81	5.85	5.34	4.93
Plastics	2.05	3.71	4.80	5.24	5.75	6.41	7.41	8.38	8.62
Index	124.15	162.80	176.73	181.64	187.62	201.43	221.85	229.09	221.48

*Five Months.

Seasonal Production Dip

Among the synthetic organics acetic acid, acetic anhydride, benzene, n-butyl alcohol, methanol, phenol, styrene, acetone, toluene, monochlorobenzene and hexachlorobenzene showed a decline in production during June, compared with May output. Some chemicals reflected an increase in demand with slight to moderate increases in production. Ethylene glycol production rose as preparations were made to meet coming demand for antifreeze. Trade sources estimate that 1949 production will total 425 million pounds or more.

Some of the other organics that showed a gain in June over May production rates are: formaldehyde, ethyl acetate, carbon bisulphide, carbon tetrachloride, cresylic acid, xylene and DDT.

Inorganic in general registered a drop in production during June when compared with May. However, several ran ahead of June 1948 rates.

Prices Level Off

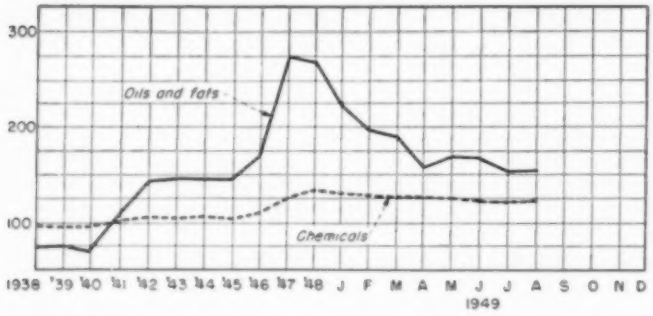
The general pattern of chemical prices was mixed last month. However, a definite leveling off in a number of chemicals that skidded downward earlier in the year marked a strengthening of many chemical markets. Metallic salts have firmed up in price. Tetraethyl lead reflected the increase in lead as Du Pont raised the price of its antiknock compound effective in October.

Prices for dyestuffs have been reduced by Du Pont and Calco Division of American Cyanamid. There was no across-the-board cut, although a large number of dyes were affected.

On September first, the *Chemical Engineering* price index for chemicals was 123.23 or a shade lower than the August index (See page 328.) On the other hand, the oils and fats index was up five points to 161.08 by the end of August.

PRICE, CONSUMPTION AND PRODUCTION TRENDS

PRICES

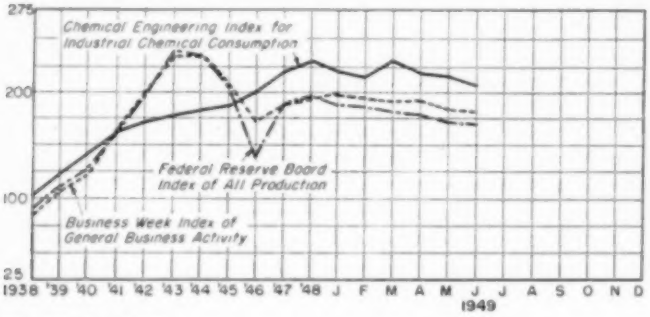


Chemical Engineering's Price Index
A month, a year, and two years ago

	Chemicals	Oils & Fats
As of September 1	123.23	161.08
Last Month	123.34	156.12
September 1948	122.22	261.67
September 1947	123.51	200.79

1937 = 100

CONSUMPTION

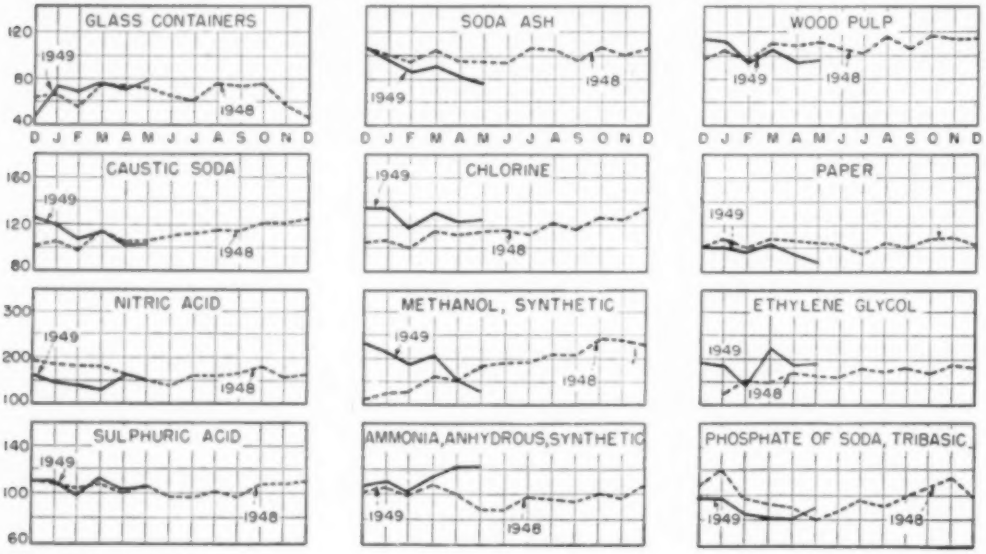

275
200
100
25
Chemical Engineering Index for Industrial Chemical Consumption
Federal Reserve Board Index of All Production
Business Week Index of General Business Activity
1938 '39 '40 '41 '42 '43 '44 '45 '46 '47 '48 J F M A M J J A S O N D
1949

Chemical Engineering's Consumption Index for Industrial Chemicals
A breakdown by consuming industries

	May (Revised)	June
Fertilizers	55.75	48.50
Pulp and paper	20.95	20.35
Petroleum refining	21.04	20.18
Glass	17.81	19.15
Paint and varnish	24.75	24.45
Iron and steel	14.10	11.90
Rayon	19.11	19.22
Textiles	8.02	8.41
Coal products	10.98	10.10
Leather	4.02	4.17
Explosives	8.44	7.41
Rubber	4.68	4.86
Plastics	7.84	8.07
INDEX	217.49	206.77

1935 = 100

PRODUCTION

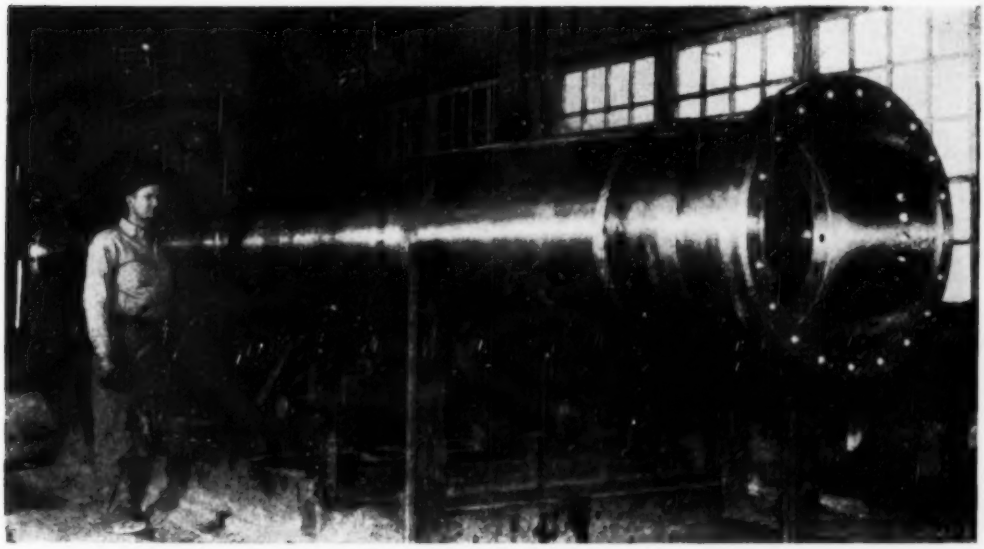


100=Monthly Average 1947

Centrifugally Cast

ACIPCO STAINLESS STEEL

Tubes and Parts



One of several 25%-20% Chrome-Nickel Stainless Steel Retorts furnished to a large chemical manufacturer. Fabricated by electric welding of centrifugally cast tube sections machined 34" O.D. by 32" I.D. by 12'-0" long, and end flange sections cast in stationary sand molds, to make a completed unit 27'-6" long. Completely machined all over. Hydrostatically tested at 300 p.s.i. and air tested at 100 p.s.i. Weight per unit 13,600 lbs.

Extensive facilities permit quantity production of centrifugally cast stainless and carbon steel tubes in diameters from 3.50" to 50" O.D. Wall thickness can be varied to suit specific applications. In addition, alloy cast irons, including the Ni-Resist grades, can be furnished in tubes of the same range of diameters and in pipe fittings. Static sand castings can be furnished from one pound to several thousand pounds.

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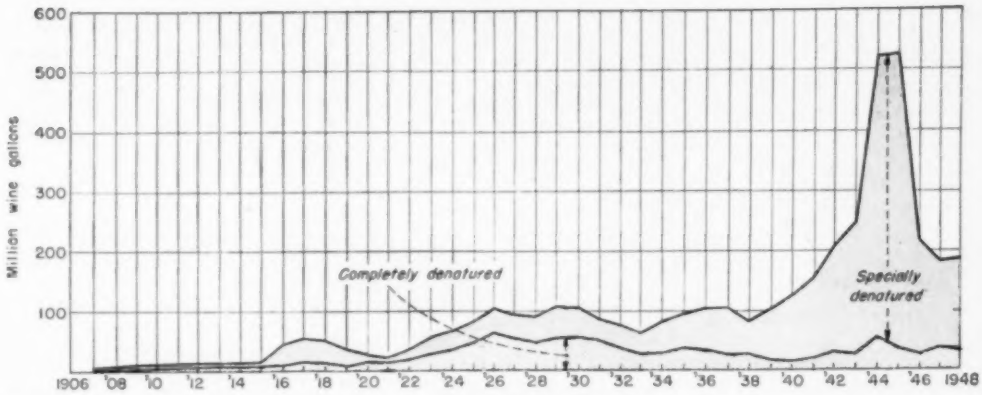

Production of specially denatured now makes up the bulk of our alcohol output.

Commodity Survey:

ETHYL ALCOHOL I

Production of this basic organic chemical reflects the long-term growth of all industry.

Ethyl alcohol is one of the top ten chemicals produced in this country. When something happens in this commodity's markets, there is real interest among chemical producers and consumers. It is a basic solvent, chemical raw material, and antifreeze. Its price and availability effect the prices of a host of other alcohols, esters and ketones.

Even before the break in its price structure, postwar alcohol consumption began to assume more normal patterns. Consumption however, remained far above prewar levels despite the fact that high ethanol prices curtailed many markets.

Close to 90 percent of the alcohol produced today is denatured. This is due to the fact that in 1906 Congress passed an act making ethyl alcohol available to industry on a tax-free basis.

End Uses for Specially Denatured Alcohol

Fiscal Year Ended June 30, 1948 Use	M wine gal.
Solvent for lacquer, varnish and enamels	3,799.9
Solvent for plastics	3,769.2
Solvents and thinners for cellulose, shellac, etc.	18,309.5
Toilet preparations	5,119.2
Industrial processing	10,832.3
Pharmaceutical preparations for external use	2,942.6
Cleaning, preserving and flavoring preparations	1,423.5
Raw material for other chemicals	101,797.1
Miscellaneous	1,849.4
Total	149,842.7

In the early years of the industry the completely denatured product was preferred. Today the situation is reversed and almost 80 percent is specially denatured for use in industry. For most solvent purposes, completely denatured alcohol has lost its earlier position and is used now mainly as antifreeze. End uses for specially denatured have grown in volume and variety.

Raw materials from which ethyl alcohol may be made fall into four general classifications: (1) cellulosic materials, including waste sulphite liquors, (2) hydrocarbon gases, (3) starchy materials such as potatoes and grain, and (4) materials containing sugar, such as sugar beets and molasses.

Up until the recent war years, blackstrap molasses was used more than any other material. Reasons: it is easily convertible into alcohol; molasses-based plants are simple in construction; require relatively less capital outlay, and molasses was available in large quantities at low prices.

During the war, raw materials of all kinds were short—yet, the need for greatly expanded alcohol production was urgent. Here, then, cost was secondary and the raw material used depended on availability, not on market price or desirability. This brought about wide shifts in the relative importance of the materials used.

Alcohol Produced from Various Raw Materials

Fiscal Years Ended June 30

Raw Material	Percent			
	1945	1946	1947	1948
Molasses	29.2	26.4	21.7	42.8
Grain	43.3	31.8	16.0	10.4
Synthetic	17.2	38.6	55.5	42.1
Other	10.3	3.2	6.8	4.7

Next year the first full-scale commercial synthetic liquid fuel plant is scheduled to go on stream and from it will come an estimated 5 million gallons per year.

Prices for alcohol were on a descending scale from 1919 until the defense program in 1940. Then the trend was reversed. From an average price of 20.5c a gallon in 1939, specially denatured No. 1 moved up to 50.6c in 1945. The rise might well have been greater except for government controls.

The alcohol market was strong throughout 1946. A short molasses supply forced a correspondingly larger use of grain and other high-priced materials. For a time, price advances were held in check by deliveries of alcohol from the government stockpile. When these were exhausted, prices rose to conform with existing production costs—the price of alcohol went up 28.5c in a single day! This trend continued in 1947 until the peak was reached at 98c for specially denatured.

Spotty conditions began to appear early in 1948. Some producers working with low-priced potatoes as a raw material began cutting prices.

Competitive selling finally drove the price down to 24c for SD 1 where it finally leveled off. On July 1, the price moved up to 31.5c per gal.

The future price situation will probably reflect competition between the various production methods, as well as the demand situation.

(Continued)

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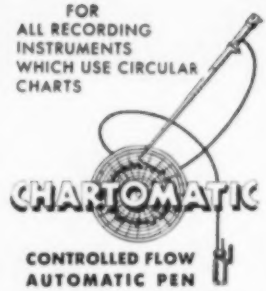

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COMMODITY SURVEY, *cont.* . . .

Industrial Alcohol Plants, Bonded Warehouse and Denaturing Plants Authorized To Operate January 1, 1949

Name	Location	Industrial Alcohol Plant	Bonded Warehouse	Denaturing Plant
California				
California Packing Corp.	San Jose			X
Commercial Solvents Corp.	Agnew	X	X	X
Hunt Foods, Inc.	Hayward			X
Lac Chemicals, Inc.	Culver City	X	X	X
Lac Chemicals, Inc.	San Francisco		X	
The New England Distilling Co.	San Francisco		X	
San Gabriel Vineyard Co.	San Gabriel	X	X	X
U. S. Industrial Chemicals, Inc.	Anaheim	X	X	X
Hiram Walker & Sons, Inc.	San Francisco		X	
Colorado				
Colorado Alcohol Co.	Denver		X	
Illinois				
Commercial Solvents Corp.	Chicago		X	
Commercial Solvents Corp.	Peoria	X	X	X
National Distillers Products Corp.	Peoria	X	X	
U. S. Department of Agriculture	Peoria	X		X
U. S. Industrial Chemicals, Inc.	Chicago		X	X
Hiram Walker & Sons, Inc., (Experimental)	Peoria			
Hiram Walker & Sons, Inc.	Peoria	X	X	
Indiana				
Carbide and Carbon Chemicals Corp.	Whiting	X	X	X
Commercial Solvents Corp.	Terre Haute	X	X	X
Merchants Distilling Corp.	Terre Haute	X	X	
Schenley Distillers, Inc.	Greendale	X	X	
Joseph E. Seagram & Sons, Inc.	Greendale	X	X	
Joseph E. Seagram & Sons, Inc.	Lawrenceburg		X	
Iowa				
Clinton Distilling Co.	Clinton	X	X	X
Grain Processing Corp.	Muscatine	X	X	X
Kansas				
Midwest Solvents Co., Inc.	Atchison	X	X	
Kentucky				
National Distillers Products Corp.	Louisville		X	
New England Distilling Co.	Frankfort		X	
U. S. Industrial Chemicals, Inc.	Louisville		X	
Louisiana				
Commercial Solvents Corp.	Harvey	X	X	X
Esso Standard Oil Co.	East Baton Rouge	X		X
Publicker Commercial Alcohol Co. of Louisiana, Inc.	Westwego	X	X	X
United Distillers of America, Inc.	Gretna	X	X	X
U. S. Industrial Chemicals, Inc.	New Orelans	X	X	X
Maryland				
Calvert Distilling Co.	Baltimore	X	X	
Commercial Solvents Corp. of Delaware	Baltimore		X	
National Distillers Products Corp.	Baltimore		X	
U. S. Industrial Chemicals, Inc.	Baltimore	X	X	X
Massachusetts				
Clinton Distilling Co.	Boston		X	
Commercial Solvents Corp.	Charlestown		X	
New England Alcohol Co.	Everett	X	X	X
U. S. Industrial Chemicals, Inc.	Boston		X	
Michigan				
Commercial Solvents Corp.	Detroit		X	
Consolidated Products Co.	Menominee	X		X
Trenton Chemical Co.	Trenton			X
U. S. Industrial Chemicals, Inc.	Detroit		X	
Missouri				
Commercial Solvents Corp.	St. Louis		X	
Consolidated Products Co.	Nixa	X		X
Mallinkrodt Chemical Works (Experimental)	St. Louis			
Spreng Co.	Kansas City	X		X
U. S. Industrial Chemicals, Inc.	St. Louis		X	
U. S. Industrial Chemicals, Inc.	Kansas City		X	
Nebraska				
Farm Crops Processing Corp.	Omaha	X	X	X
New Jersey				
Commercial Solvents Corp.	Newark		X	X
E. I. du Pont de Nemours and Co.	Deepwater Point	X	X	X
Shell Chemical Corp.	Sewaren		X	X
E. R. Squibb & Sons	New Brunswick			X
U. S. Industrial Chemicals, Inc.	Newark	X	X	X
New York				
United Distillers of America, Inc.	Yonkers	X	X	X
Ohio				
Commercial Solvents Corp.	Cincinnati		X	
Commercial Solvents Corp.	Cleveland		X	
National Distillers Products Corp.	Cincinnati	X	X	
U. S. Industrial Chemicals, Inc.	Cincinnati		X	
Oklahoma				
Stanolind Oil and Gas Co. (Experimental)	Tulsa			
Pennsylvania				
Continental Distilling Corp.	Philadelphia	X	X	X
New England Distilling Co.	Schenley		X	
New England Distilling Co.	Loganaport		X	
A. Overholt & Co., Inc.	Broad Ford	X	X	
A. Overholt & Co., Inc.	Large	X	X	
Publicker Industries, Inc.	Philadelphia	X	X	X
South Dakota				
The New England Distilling Co.	Yankton	X	X	
Texas				
Carbide and Carbon Chemicals Corp.	Texas City	X	X	X
Shell Chemical Corp.	Deer Park	X	X	
Virginia				
Hercules Powder Co.	Hopewell	X		X
Washington				
Lac Chemicals, Inc.	Seattle		X	
Puget Sound Pulp and Timber Co.	Bellingham	X	X	X
West Virginia				
Carbide and Carbon Chemicals Corp.	So. Charleston	X	X	X
Carbide and Carbon Chemicals Corp.	Institute			X
E. I. du Pont de Nemours and Co.	Belle	X		X
Wisconsin				
Western Condensing Co.	Adell	X		X

Source: U. S. Treasury Dept.

—End

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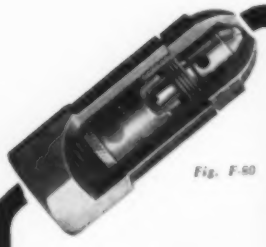

Fig. F-80

STAINLESS STEEL:

Available in capacities from .57 G.P.H. Fig. F-80 style illustrated, to 104 G.P.M. (Fig. B-8-A style)
"Hollow" cone, "Solid" cone, and "Flat" sprays furnished in pipe sizes and capacities to suit practically any problem where corrosive liquids are sprayed.

STONEWARE:

Monarch Fig. 6020 and Fig. 6040 stoneware sprays have replaced most other types of nozzles used in acid chamber plants throughout the world. Last almost indefinitely in sulfur gases and will not break or crack from temperature changes.

HARD RUBBER:

Patented Fig. B-27 nozzle is of the "non-clog" type, i.e. it contains no internal vanes, slots, or deflectors which might facilitate clogging. Available ¼" to 1" pipe. Small sizes produce a very fine, soft, wide angle hollow cone spray, even at low pressures.
Fig. H-407 "flat" spray produces a relatively fine even sheet of liquid.

Write for Catalogs 6A and 6C

MONARCH MFG. WKS, INC.
2513 E. ONTARIO ST.
PHILADELPHIA 34, PA.

United States Production of Certain Chemicals

Chemicals (Tons unless otherwise noted)	May 1949	May 1948	April 1949	April[1] 1948[1]
Ammonia, synthetic, anhydrous[2]	110,129	92,408	109,306	92,640
Ammonium nitrate	93,586	76,000	93,736	79,978
Ammonium sulphate, synthetic (M lb.)	43,698	29,622	63,196	28,489
Calcium arsenate (M lb.)	1,315	3,200	1,189	3,910
Calcium carbide, commercial	45,904	80,000	50,762	87,949
Carbon dioxide:				
Liquid and gas (M lb.)	22,184	20,900	18,792	19,545
Solid (M lb.)	81,481	75,317	86,988	83,715
Chlorine	143,718	120,936	140,791	126,992
Chrome green (M lb.)	456	1,097	880	1,196
Chrome yellow and orange, (C.P.) (M lb.)	2,004	3,871	1,773	4,525
Hydrochloric acid	37,824	39,349	40,080	38,306
Hydrogen (M cu. ft.)	2,181	2,304	2,196	2,244
Lead arsenate, acid and basic (M lb.)	711	3,127	1,627	3,814
Molybdate chrome orange, (C.P.) (M lb.	347	577	315	518
Nitric acid	99,800	86,487	101,804	94,904
Oxygen (M cu. ft.)	1,286	1,370	1,367	1,382
Phosphoric acid (50 percent H_3PO_4)	111,931	96,563	108,464	97,810
Soda ash:				
Ammonia-soda process:				
Total wet and dry[2]	285,741	309,110	312,647	357,752
Finished light[2]	139,208	176,450	163,552	177,047
Finished dense	103,144	125,350	107,737	120,806
Natural[3]	17,365	23,418	14,478	20,288
Sodium bicarbonate, refined	11,808	13,387	11,874	12,596
Sodium bichromate and chromate	5,286	7,982	7,105	8,184
Sodium hydroxide:				
Electrolyte process:				
Liquid[4]	134,523	126,106	128,933	124,002
Solid	19,535	23,393	21,385	20,732
Lime-soda process:				
Liquid[4]	42,180	60,165	46,917	62,296
Solid	12,486	19,109	15,810	19,013
Sodium phosphate:				
Monobasic	911	1,080	995	781
Dibasic	9,180	5,736	9,844	7,045
Tribasic	6,236	5,804	5,548	6,116
Meta	2,019	2,827	2,677	3,179
Tetra	5,398	5,208	5,868	5,057
Sodium silicate, anhydrous	43,277	33,388	32,879	38,773
Sodium sulphate:				
Anhydrous	10,239	12,876	9,831	15,079
Glauber's salt[5]	11,881	15,828	12,170	15,942
Salt cake[5]	45,308	57,662	48,254	54,986
Sulphuric acid[6]:				
Chamber process	222,160	262,200	222,714	253,153
Contact process, new	655,732	613,646	624,799	606,047

Data for this tabulation have been taken from "Facts for Industry" series issued by Bureau of the Census. Production figures represent primary production and do not include purchased or transferred materials. Quantities produced by government-owned arsenals, ordnance works, and certain plants operated for the government by private industry are not included. Chemicals manufactured by TVA, however, are included. All tons are 2,000 lb. Where no figures are given data are either confidential or not yet available. [1]Includes a small amount of aqua ammonia. [2]Total wet and dry production, including quantities diverted for manufacture of caustic soda and sodium bicarbonate, and quantities processed to finish light and finished dense. [3]Not including quantities converted to finished dense. [4]Data collected in cooperation with the Bureau of Mines. [5]Figures represent total production of liquid materials, including quantities evaporated to solid caustic and reported as such. [6]Includes oleum grades, excludes spent acid. [7]Data for sulphuric acid manufactured as a byproduct of smelting operations are included.

United States Production of Synthetic Organic Chemicals

Chemical	May 1949	May 1948	April 1949	April 1948
Acetanilid	321,107	170,791	739,711	343,984
Acetic acid:				
Synthetic[1]	27,887,015	37,144,452	27,820,105	31,245,949
Recovered	93,737,024	141,818,853	95,924,485	137,955,466
Natural[2]	...	1,946,262	1,788,236	1,988,270
Acetic anhydride[1]	59,774,520	64,040,891	59,459,493	60,102,859
Acetone	33,410,177	42,127,667	33,663,234	38,478,433
Acetylsalicylic acid	939,913	950,576	903,773	1,081,605
Aniline	8,829,300	7,839,405	8,629,451	8,970,426

(Continued on page 336)

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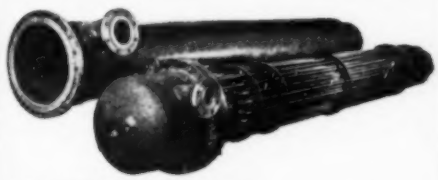

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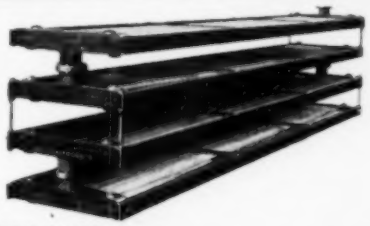
A finned type unit with many important advantages for heating viscous liquids to be withdrawn from storage tanks. Described in Bulletin 1642.

G-R TWIN G-FIN SECTION
An all-purpose heater, cooler, condenser or heat exchanger having the widest heat transfer applications of any design on the market. More than 50,000 installed units. Described in Bulletin 1614.

FIN-FAN EXCHANGER (A joint Fluor—Griscom-Russell development)
A "package type" air-cooled condenser or cooler with G-R K-Fin Sections. Can be installed on the ground, on a roof, or within a building. Described in Bulletin 1231.



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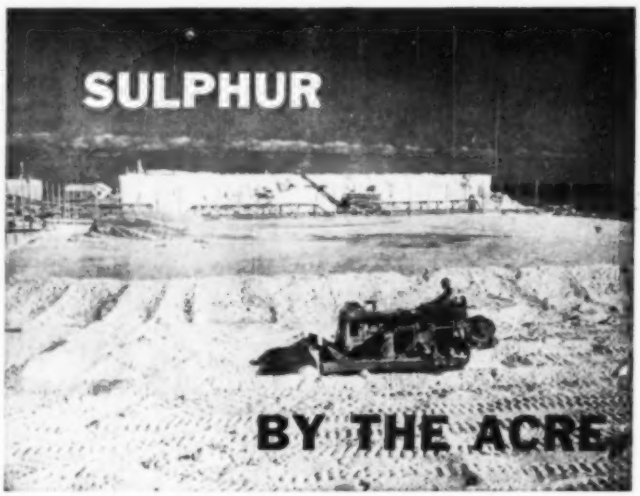
"HIGH INTENSITY"

U. S. Production of Synthetic Organic Chemicals, cont. from page 334

Chemical	May 1949	May 1948	April 1949	April 1948
Barbituric acid derivatives:[a]				
5-Ethyl-5-phenylbarbituric acid and salts (phenobarbital)	22,960	18,437	26,881	21,400
Benzene:				
Motor grade:				
Coke oven operators[b]	2,613,392	919,070	2,940,613	633,389
All other grades:				
Tar distillers[c]	928,150	1,123,304	654,094	981,687
Coke oven operators[d]	11,220,088	12,161,976	11,981,066	10,423,913
Butyl alcohol, primary, normal	9,846,981	10,103,815	8,607,646	11,022,463
Carbon bisulphide	26,237,968	37,533,338	26,753,622	30,358,266
Carbon tetrachloride	13,607,213	17,251,426	14,653,507	18,416,603
Chlorobenzene, mono	17,162,002	24,226,129	24,396,096	24,941,890
Creosote oil:				
Tar distillers[c]	11,478,268	8,646,171	11,347,733	9,874,299
Coke oven operators[d]	2,249,991	2,946,214	1,901,948	3,009,204
Cresols, meta-para	235,268	663,632	366,893	803,279
Cresols, ortho-meta-para	500,916	908,665	347,825	583,072
Cresylic acid, refined[e, m]	1,749,040	2,715,342	2,140,800	1,870,625
Dibutyl phthalate	...	1,428,480	1,229,900	1,166,424
Dichlorodiphenyltrichloroethane (DDT)	2,980,012	562,648	3,053,653	1,891,075
Ethyl acetate (85 percent)	5,508,203	5,787,618	6,436,287	5,422,126
Ethylene glycol	36,679,833	32,144,429	36,089,336	28,360,553
Ethyl ether	2,546,172	3,218,547	2,898,238	2,998,092
Formaldehyde, 37 percent by wt	38,519,779	55,030,129	36,619,300	54,490,472
Hexachlorocyclohexane	898,328	1,709,200	1,223,111	1,653,514
Methanol, natural	...	1,348,929	1,105,103	1,421,431
Methanol, synthetic	58,857,386	84,900,442	68,072,234	89,645,748
Naphthalene:				
Tar distillers, less than 79° C	8,209,370	17,827,189	8,456,210	15,148,292
Tar distillers, 79° C. and over	4,972,831	7,966,183	6,691,671	9,481,434
Coke-oven operators, less than 79° C	6,860,966	8,042,261	7,706,438	7,181,936
Penicillin and salts[f]	11,946,327	8,305,435	11,364,759	6,946,351
Phenol	16,165,986	25,408,307	22,182,077	23,248,576
Phthalic anhydride	9,367,421	12,631,777	10,192,219	13,071,357
Styrene, government and private plant	32,089,096	35,591,400	33,157,895	32,531,701
Toluene:				
Coke-oven operators	2,467,671	2,355,193	2,520,828	1,939,596
All other[g]	4,815,042	4,082,053	3,281,370	2,966,550
Xylene, crude	4,924,885	5,632,101	3,925,331	5,080,026

All data in pounds except benzene (gal.) creosote oil (gal.), toluene (gal.) xylene (gal.) and penicillin (million Oxford units). Statistics collected and compiled by U. S. Tariff Commission except where noted. Absence of data on production indicates either that returns were unavailable or confidential. [a]Excludes the statistics on recovered acid. [b]Acid produced by direct process from wood and from calcium acetate. [c]All acetic anhydride including that from acetic by vapor-phase process. [d]Product of distillers who use purchased coal tar only or from oil-gas or water-gas produced or purchased by tar distillers. [e]Statistics are given in terms of bulk medicinals only. [f]Statistics collected by Bureau of Mines. [g]Total production including data reported both by coke-oven operators and by distillers of purchased coal tar. [h]Reported to U. S. Bureau of the Census. [i]Includes toluene produced from petroleum by any process. [m]Includes refined cresylic acid from petroleum.



Sulphur mined from its Gulf Coast deposit will be stored in this vat of Freeport Sulphur Company at its Grande Ecaille property in Louisiana. Sulphur storage blocks of solid yellow stone often rise as high as 50 feet and stretch over as much as 5 acres.

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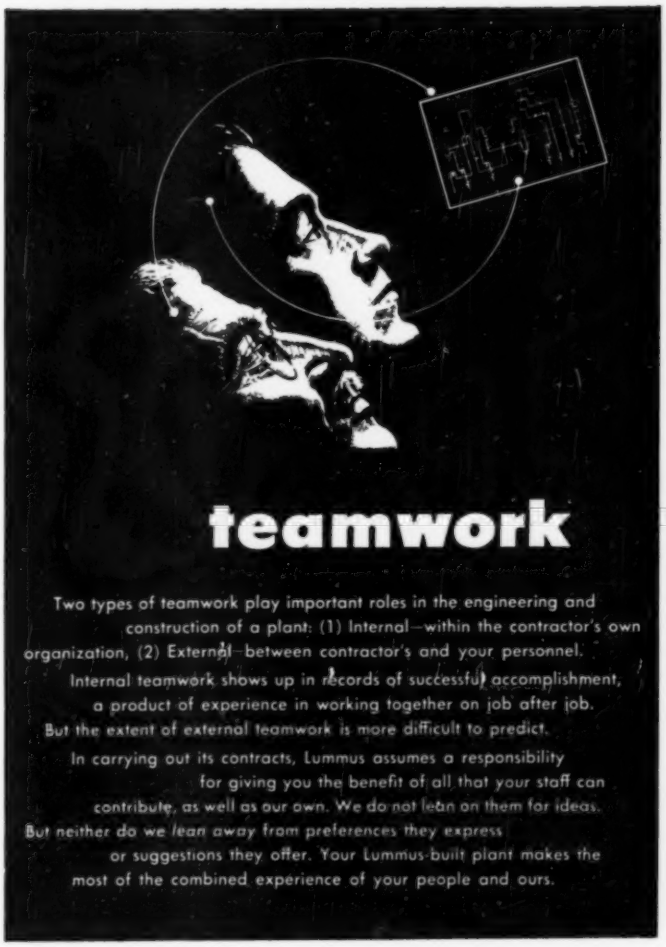

teamwork

Two types of teamwork play important roles in the engineering and construction of a plant: (1) Internal—within the contractor's own organization, (2) External—between contractor's and your personnel.

Internal teamwork shows up in records of successful accomplishment, a product of experience in working together on job after job. But the extent of external teamwork is more difficult to predict.

In carrying out its contracts, Lummus assumes a responsibility for giving you the benefit of all that your staff can contribute, as well as our own. We do not lean on them for ideas. But neither do we *lean away* from preferences they express or suggestions they offer. Your Lummus-built plant makes the most of the combined experience of your people and ours.

teamwork
in process development

In the development of improved methods of producing lubricating oil, Lummus has worked in close-knit cooperation with many leading oil companies. Lummus' exclusive pilot plant equipment for lube-oil process development has been employed to explore process alternatives suggested by these customers, supplementing their own research. More than 85 process units for solvent refining and dewaxing have resulted from this work —including the largest lube-oil plant in the world.

teamwork
in plant design

Lummus coordinated its engineering with the requirements and preferences of a leading chemical company—and laid the groundwork for an advanced type of ethylene plant. High yields are being obtained from a wide range of charge stocks. Operating costs are favorable, too.

teamwork
in plant construction

Construction in foreign countries and remote locations calls for a close relationship at the site between Lummus' personnel and oil company field forces. Assignment of men with a thorough knowledge of the region, its customs, laws and labor regulations, helps maintain this local cooperation. Records are maintained in accordance with client requirements for progress reports and cost control.

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New Construction

	Current Projects		Cumulative 1949	
	Proposed Work	Contracts	Proposed Work	Contracts
New England	.....	.....	$274,000	$1,260,000
Middle Atlantic	$370,000	$2,527,000	161,953,000	11,465,000
South	.....	.....	9,051,000	25,824,000
Middle West	.....	720,000	19,354,000	31,725,000
West of Mississippi	26,650,000	12,619,000	67,590,000	69,546,000
Far West	7,125,000	22,425,000	11,600,000	61,791,000
Canada	.....	3,490,000	30,505,000	60,680,000
Total	$34,125,000	$41,781,000	$300,327,000	$262,291,000

Proposed Work

Colo., Rifle and Newcastle—Columbine Development Co., Preston Walker, Gen. Mgr., Grand Junction, plans to construct a paper mill here. Estimated cost $15,000,000.

N. Y., Long Island City—McKesson & Robbins, 155 East 44th St., New York 17, N. Y., plan to construct a warehouse and office building on 22nd St. Chapman, Evans & Delehanty, 50 Broadway, New York 4, N. Y., Archts. Estimated cost. $300,000.

Pa., Oaks—B. F. Goodrich Co., Oaks, plans to alter its plant here. Estimated cost $70,000.

Tex., Midland—Pittsburgh Plate Glass Co., c/o T. Jackson, Santa Fe Bldg., Dallas, plans to construct a plant and shop here. Walter W. Ahlschlager, 212 South St. Paul St., Dallas, Archt. Estimated cost $150,000.

Tex., Sweetwater—Gulf Oil Co., Sweetwater, plans to expand its refinery. Estimated cost $500,000.

Tex., Victoria—E. I. du Pont de Nemours & Co., Inc., Construction Division, LaPorte, and Wilmington, Del., plans to construct a plant here for the manufacture of chemical intermediates of nylon to consist of 13 plant buildings on a 1700 acre tract on the Guadalupe River. These chemical processing products will be shipped mostly to owners plants throughout the country for making nylon yarns and plastics. Frank R. MacKie, c/o owners, Wilmington, Del., Eng. Estimated cost $10,000,000.

Utah, Salt Lake City—The Salt Lake Pipeline Co., Utah Oil Bldg., Salt Lake City, Utah subsidiary of Standard Oil Co. of California, plans to construct a 320 mile 8 in. pipeline (of a total 560 mi. line) between Salt Lake City and Boise, Idaho. Estimated cost $6,850,000.

Utah, Salt Lake City—The Salt Lake Pipeline Co., Utah Oil Bldg., Salt Lake City, subsidiary of Standard Oil Co. of California, plans to construct an oil products pumping station. Estimated cost $275,000.

Contracts Awarded

Calif., Brea—Union Oil Co. of California, 617 West 7th St., Los Angeles, has awarded the contract for a research plant consisting of 12 buildings including research and engineering laboratories, administration building, etc., to P. J. Walker, 3900 Whiteside Ave., Los Angeles. Estimated cost $5,000,000.

Calif., Torrance—General Petroleum Corp., 108 West 2nd St., Los Angeles, has awarded the contract for a "coker" unit addition to its refinery to Bechtel Corp., Box 156, Torrance. Estimated cost $2,250,000.

Calif., Whitewater—S. A. Guiberson, Jr., 2361 Hollyridge Dr., Los Angeles, has awarded the contract for the construction of a cement mill to McNeil Construction Co., 5860 Avalon Blvd., Los Angeles. Estimated cost $15,000,000.

Ill., Chicago—General Chemical Co., 12260 Carondelet St., has awarded the contract for an addition to its plant to R. E. Lekander, 7412 Vincennes St., Chicago. Estimated cost $70,000.

Ill., Melrose Park—Benjamin Moore & Co., 415 Green Sts., Chicago, paint manufacturers, will construct a 3 story, 61x220 ft. factory, 1 story, 60x202 ft. office, 1 story, 24x300 ft. warehouse and 1 story boiler house here. Work will be done with own forces. Estimated cost $650,000.

Ore., Portland—T. E. & J. C. deShazor, 1900 S.W. Water St., have awarded the contract for a 3 story factory for Plastic Arts Center to Wilson & Dean, 2023 N. E. 58th St. Estimated cost $175,000.

Pa., Bristol—Hunter-Wilson Distilling Co., Inc., Green Lane, has awarded the contract for an addition to its distillery to Lombardi & Co., 345 North 12th St., Philadelphia. Estimated cost $68,000.

Pa., Easton—Dixie Cup Co., Easton, has awarded the contract for a 1 story, 202x602 ft. warehouse to Lauter Construction Co., 112 South 16th St., Philadelphia. Estimated cost $700,000.

Pa., Philadelphia—Gulf Oil Corp., Gulf Bldg., has awarded the contract for a plant addition to Hughes-Foulkrod Co., 1505 Race St. Estimated cost will exceed $68,000.

Pa., West Mifflin—Westinghouse Electric Corp., Atomic Power Div., has awarded the contract for a 1 and 2 story, 130,000 sq. ft. main laboratory and office building at Bettis Field site, to Ragner-Benson, Inc., 4744 West Rice St., Chicago, at $1,690,637.

Tex., Baytown—Humble Oil & Refining Co., Baytown, has awarded the contract for two additions to its plant to Tellepson Construction Co., 1710 Telephone Rd., Houston. Estimated cost $269,000.

Tex., Brownsville—Humble Oil & Refining Co., Humble Bldg., Houston, has awarded the contract for a bulk plant to W. F. Ferguson & Son, Brownsville. Estimated cost $140,000.

Tex., Carthage—United Gas Corp., Carthage, has awarded the contract for doubling or expanding its gasoline plant to Hudson Engineering Corp., 2711 Danville St., Houston. Estimated cost $3,000,000.

Tex., Galveston—Pittsburgh Plate Glass Co., 2311 Mechanic St., Galveston, will remodel and enlarge its glass plant. Work will be done by owners. Estimated cost $75,000.

Tex., Houston—Kulm Paint Co., 4020 Center St., will construct an addition to its plant using its own forces. Estimated cost $75,000.

Tex., Kelsey—Humble Oil & Refining Co., 1216 Main St., Houston, will construct a gas injection plant unit. Work will be done with own forces. Estimated cost $235,000.

Tex., Provident City—Shell Oil Co., Inc., Shell Bldg., Houston, has awarded the contract for a gasoline plant to Fluor Corp., Ltd., M. Esperson Bldg., Houston. Estimated cost $1,350,000.

Tex., Refugio—Bennett Oil & Refining Co., Refugio, will reconstruct its topping plant. Work will be done with own forces. Estimated cost $100,000.

Tex., Rio Grande City—Continental Oil Co., Ponca City, Okla., will enlarge its gasoline plant 20 mi. north of here. Work will be done by owners. Estimated cost $1,350,000.

Tex., Spearman—Phillips Petroleum Co., Bartlesville, Okla., contract to Starker Construction Co., Spearman, additional improvements and expansion of refinery known as Sherman Plant, $2,225,000; gasoline plant unit, $2,600,000; steam boiler plant, $475,000; gasoline and products storage $125,000. Grand total $5,425,00.

Tex., Tom Ball—Humble Oil & Refining Co., Humble Bldg., Houston, has awarded the contract for an additional compressor unit at its refinery to Fluor Corp., Ltd., M. Esperson Bldg., Houston. Estimated cost $175,000.

Tex., Tom Ball—Humble Oil & Refining Co., Humble Bldg., Houston, will enlarge its gasoline plant and construct additional gas gathering lines in Tom Ball field. Work will be done by owners. Estimated cost $350,000 and $75,000 respectively.

Ont., Mathieson—Canadian Johns-Manville Co., Ltd., Asbestos, Que., has awarded the contract for design and construction of mill buildings, townsite, service, etc. at Munroe Twp. to Foundation Co. of Ontariom Ltd., 1220 Bay St., Toronto. Estimated cost $3,000,000.

Ont., Port Edward—Chemical Valley Fabricating will construct the first unit of a plant here with own forces. Estimated cost $150,000.

Ont., Toronto—Universal Paper Products Co. Canada, Ltd., 355 Logan Ave., has awarded the contract for a 2 story factory to Kritzer & Conforze Co., Ltd., 1998 Dufferin St. Estimated cost $90,000.

Que., Coleraine—St. Lawrence Asbestos Co., Ltd., Coleraine, has awarded the contract for the construction of an asbestos mill to C. Douville c/o owner. Estimated cost $250,000.

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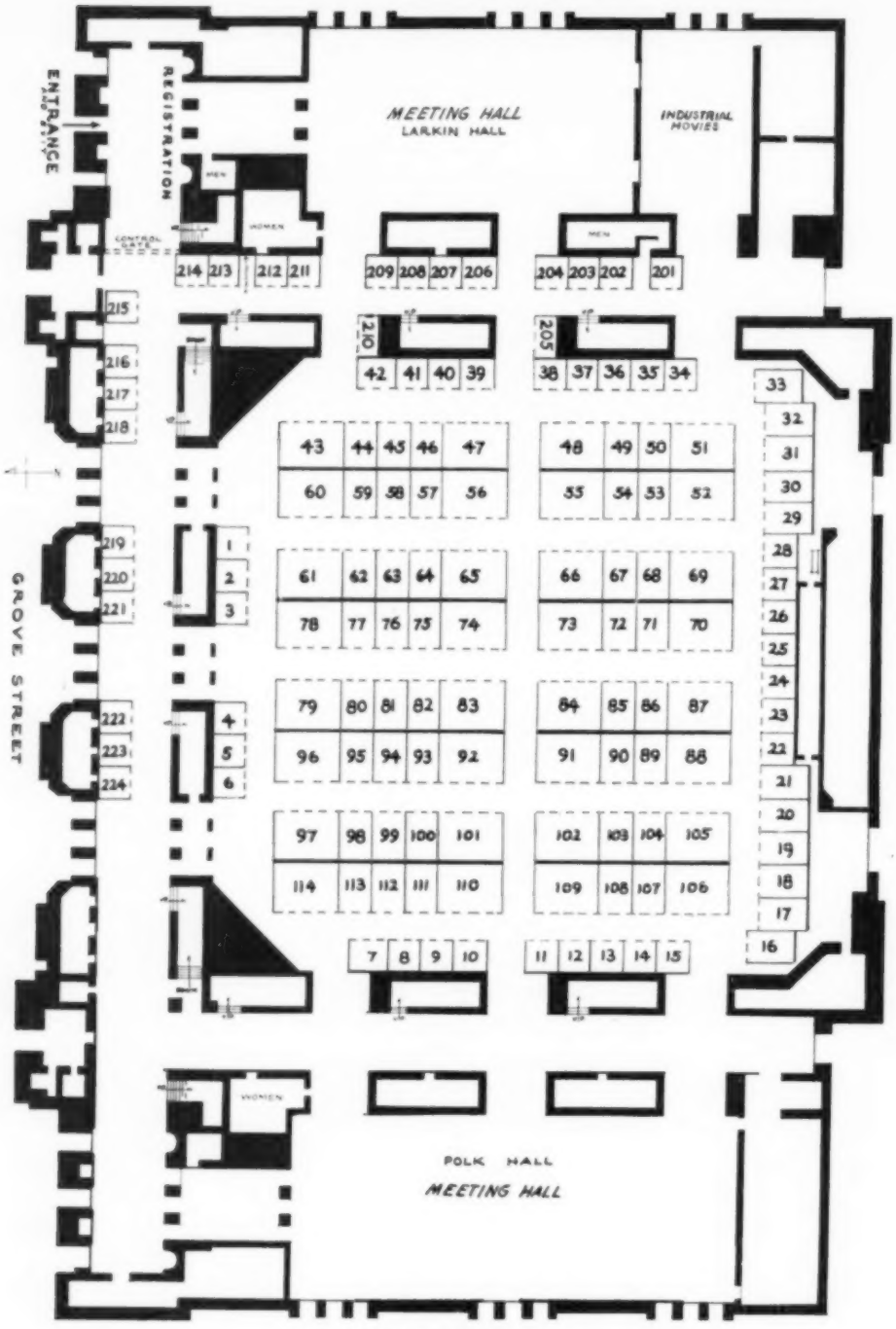
SAN FRANCISCO

NOVEMBER 1-5, 1949

PACIFIC CHEMICAL EXPOSITION

SAN FRANCISCO CIVIC AUDITORIUM • NOVEMBER 1st to 5th incl., 1949



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★ EXHIBITORS ★

PACIFIC CHEMICAL EXPOSITION

ALBERENE STONE CORPORATION OF VIRGINIA, 419 Fourth Avenue, New York 16, New York. Host: Douglas R. Stiehl 1-2

AMERICAN CYANAMID COMPANY, 30 Rockefeller Plaza, New York 20, New York. Host: M. J. Wixson 92

AMERICAN HEAT RECLAIMING CORP., 1270 Sixth Avenue, New York 20, New York. Host: Douglas R. Stiehl 1-2

AMERICAN OPTICAL COMPANY, SCIENTIFIC INSTRUMENT DIVISION, Buffalo 15, New York. Host: Ray G. Betka 42

ANTARA PRODUCTS, GENERAL ANILINE & FILM CORP., 444 Madison Avenue, New York 22, New York. Host: Richard F. Tomlinson 68

ATLAS MINERAL PRODUCTS COMPANY, Mertztown, Pennsylvania. Host: Douglas R. Stiehl 1-2

BARTON INSTRUMENT COMPANY, 3500 Union Pacific Avenue, Los Angeles 23, California 28

BEMIS BRO. BAG CO., 408 Pine Street, St. Louis 2, Missouri. Host: A. B. Merriam 74

BONNEY FORGE & TOOL WORKS, Allentown, Pennsylvania. Host: Walter L. Duhig 75

BRAUN-KNECHT-HEIMANN CO., 1400 Sixteenth Street, San Francisco 19, California. Host: W. Kissling 52

BUSHNELL CONTROLS AND EQUIPMENT CO., INC., 509 Polk Street, San Francisco 2, California 28

CAMERON IRON WORKS, INC., Post Office Box 1212, Houston 1, Texas. Host: Jack W. Harris 201

CARBIDE AND CARBON CHEMICALS CORPORATION, 30 East 42nd Street, New York 17, New York. Host: M. H. Scott 27

CENTRAL SCIENTIFIC COMPANY, 1700 Irving Park Road, Chicago 13, Illinois 39-40

CHEMICAL ENGINEERING, 330 West 42nd Street, New York 18, New York. Host: L. E. Crist 78

CHEMICAL INDUSTRIES, 522 Fifth Avenue, New York 18, New York. Host: Robert L. Taylor 43

CHIKSAN COMPANY, Brea, California. Host: H. J. Stock 58

CLIMAX ENGINEERING COMPANY, 509 Polk Street, San Francisco 2, California 28

COMMERCIAL FILTERS CORPORATION, 18 West Third Street, Boston 27, Massachusetts. Host: E. W. Sherburne 89

COMMERCIAL SOLVENTS CORPORATION, 110 Sutter Street, San Francisco 4, California. Host: E. W. Bacigalupi 66

CONTINENTAL CAN COMPANY, INC., 975 Glenn Street, Van Wert, Ohio. Host: R. A. Lehman 77

COOPER ALLOY FOUNDRY CO., Hillside, New Jersey. Host: Walter L. Duhig 75

THE DOW CHEMICAL COMPANY, Midland, Michigan. Host: R. L. Lownsbury 53-54-55

WALTER L. DUHIG & CO., 714 West Olympic Boulevard, Los Angeles 15, California. Host: Walter L. Duhig 75-76

DURAMETALLIC CORPORATION, Factory Street, Kalamazoo, Michigan. Host: Irvin Reed 38

THE DURIRON COMPANY, INC., 450 North Findlay Street, Dayton 1, Ohio. Host: Douglas R. Stiehl 1-2

ELECTRIC STEEL FOUNDRY, 249 First Street, San Francisco 5, California. Host: C. E. Haney 56-57

ENZINGER UNION CORP., Angola, New York. Host: "Vic" Breglio 64

FERNHOLTZ MACHINERY CO., 150 North Norton Avenue, Los Angeles 4, California 36-37

FIRST MACHINERY CORP., 157 Hudson Street, New York 13, New York 204

FISCHER & PORTER COMPANY, 3124 East 14th Street, Oakland 1, California. Host: Adelbert Carpenter 215

FISHER GOVERNOR COMPANY, Marshalltown, Iowa. Host: George R. Friederich 11-12

FOOD INDUSTRIES, 330 West 42nd Street, New York 18, New York. Host: L. E. Crist 78

GEORGE R. FRIEDERICH & CO., 725 Tehama Street, San Francisco 3, California. Host: George R. Friederich 11-12

GENERAL ANILINE & FILM CORP., ANTARA PRODUCTS, 444 Madison Avenue, New York 22, New York. Host: Richard F. Tomlinson 68

GLASS ENGINEERING LABORATORIES, 601 O'Neill Avenue, Belmont, California 63

HARDINGE COMPANY INCORPORATED, 240 Arch Street, York, Pennsylvania 210

HAVEG CORPORATION, Newark 3, Delaware. Host: C. R. Runk 10

THE HAYS CORPORATION, Michigan City, Indiana 28

HILLS-McCANNA COMPANY, 3025 North Western Avenue, Chicago 18, Illinois. Host: Douglas R. Stiehl 1-2

K. H. HUPPERT CO., 6830 Cottage Grove Avenue, Chicago 37, Illinois. Host: K. H. Huppert 205

HYSTER COMPANY, 233 Ninth Street, San Francisco 3, California 7

INTERNATIONAL INSTRUMENT CO., Post Office Box 7781, Los Angeles 15, California 41

JABSCO PUMP CO., 2031 North Lincoln Street, Burbank, California. Host: M. C. McCray 35

JACK-STIEHL CO., 605 Addison Street, Berkeley 10, California. Host: Douglas R. Stiehl 1-2

JERGUSON GAGE & VALVE COMPANY, 87 Fellsway, Somerville 45, Massachusetts 28

KIMBLE GLASS, DIVISION OF OWENS-ILLINOIS GLASS COMPANY, Box 1035, Toledo 1, Ohio. Host: E. J. Rhein 62

LABORATORY EQUIPMENT COMPANY, 118 Eleventh Street, San Francisco 3, California 34

LOS ANGELES CHEMICAL COMPANY, 1960 Santa Fe Avenue, Los Angeles 21, California. Host: W. W. Broughton 81

A. R. MAAS CHEMICAL CO., 4570 Ardine Street, South Gate, California. Host: John Hotz 71

MACLEAN-HUNTER PUBLISHING CORPORATION, 522 Fifth Avenue, New York 18, New York. Host: Robert L. Taylor 43

McGRAW-HILL PUBLISHING CO., INC., 330 West 42nd Street, New York 18, New York. Host: L. E. Crist 78

MICROCHEMICAL SPECIALTIES CO., 1834 University Avenue, Berkeley 3, California. Host: Edward R. Tompkins 219

MONSANTO CHEMICAL COMPANY, 1700 South Second Street, St. Louis 4, Missouri. Host: William A. Lang 102-103-104

NATIONAL ENGINEERING CO., 549 West Washington Boulevard, Chicago 6, Illinois. Host: Otto H. Rosentreter 3

NATIONAL TANK & MFG. CO., Post Office Box 4738, Los Angeles 1, California. Host: "Vic" Breglio 64

NATIONAL TECHNICAL LABORATORIES, 820 Mission Street, South Pasadena, California. Host: T. F. Herring 24-25

NEW ENGLAND TANK & TOWER COMPANY, 42 Main Street, Everett, Massachusetts. Host: Douglas R. Stiehl 1-2

NIAGARA FILTER CORPORATION, 3080 Main Street, Buffalo 14, New York. Host: C. T. White 14

NURNBERG THERMOMETER CO., INC., 2127 Fourth Street, Berkeley, California. Host: Jack Hutchison 26

ORONITE CHEMICAL COMPANY, 38 Sansome Street, San Francisco 4, California. Host: T. R. Johnson 73

G. R. OSTER, 606 Hollingsworth Bldg., Los Angeles 14, California. Host: Douglas R. Stiehl 1-2

OWENS-ILLINOIS GLASS COMPANY, KIMBLE GLASS DIVISION, Box 1035, Toledo 1, Ohio. Host: E. J. Rhein 62

PACIFIC COAST RUBBER COMPANY, 51 Main Street, San Francisco 5, California. Host: Irvin Reed 38

PETROLITE CORPORATION, LTD., WAX DIVISION, 30 Broad Street, New York 4, New York. Host: J. S. Lyall 45

PHILADELPHIA QUARTZ COMPANY OF CALIFORNIA, Sixth and Grayson Streets, Berkeley 10, California. Host: Glenn Johnson 4

PITTSBURGH *LECTRODRYER* CORPORATION, Post Office Box 1766, Pittsburgh 30, Pennsylvania. Host: Douglas R. Stiehl 1-2

POWER PRODUCTS COMPANY, 11 Broadway, New York City. Host: Douglas R. Stiehl 1-2

RADIOISOTOPE APPLICATIONS CO., 1834 University Avenue, Berkeley 3, California. Host: Edward R. Tompkins 219

Continued

★ EXHIBITORS ★

SANTA FE TANK & TOWER COMPANY, 5401 South Boyle Avenue, Los Angeles 11, California. Host: L. R. Obert 8

SCIENTIFIC SERVICE, INC., 1834 University Avenue, Berkeley 3, California. Host: Edward R. Tompkins 219

W. S. SHAMBAN & CO., 2363 East 38th Street, Los Angeles 11, California. Host: James C. Byal 217

SHELL CHEMICAL CORPORATION, 100 Bush Street, San Francisco 6, California. Host: G. R. Monkhouse 84-85

ORVILLE SIMPSON COMPANY, 1230 Knowlton Street, Cincinnati 23, Ohio. Host: Douglas R. Stiehl 1-2

SOUTHWESTERN ENGINEERING COMPANY, 4800 Santa Fe Avenue, Los Angeles 11, California. Host: G. B. Faust 33

SPECIALIZED INSTRUMENTS CORPORATION, 601 O'Neill Avenue, Belmont, California 63

SPECIALTY BRASS COMPANY, 1018 23rd Avenue, Oakland 6, California 9

SPECIALTY SALES COMPANY, 208 South West Temple, Salt Lake City 1, Utah. Host: Wm. H. Sayler 23

SPENCER CHEMICAL COMPANY, 610 Dwight Building, Kansas City 6, Missouri. Host: J. R. Riley, Jr. 83

J. W. STACEY, INC., 551 Market Street, San Francisco 5, California. Host: Ernest G. Gonzales 216

STEDMAN'S FOUNDRY & MACHINE WORKS, 507 Indiana Avenue, Aurora, Indiana. Host: Douglas R. Stiehl 1-2

TRACERLAB, INC., 2295 San Pablo Avenue, Berkeley 2, California. Host: Walton A. Wickett 82

TRI-CLOVER MACHINE CO., 2809-60th Street, Kenosha 5, Wisconsin. Host: William R. Worboys 72

UNION CARBIDE AND CARBON CORPORATION, 30 East 42nd Street, New York 17, New York. Host: M. H. Scott 27

WALKER-WALLACE, INC., 1370 Main Street, Buffalo 9, New York. Host: G. M. Irving 46

THE WATSON-STILLMAN CO., Roselle, New Jersey. Host: Walter L. Duhig 76

W. M. WELCH MANUFACTURING COMPANY, 1515 North Sedgwick Street, Chicago 10, Illinois. Host: J. Gutsmiedl 5-6

WINSLOW STANDARD GOVERNMENT SCALE COMPANY, 605 Addison Street, Berkeley 10, California. Host: Douglas R. Stiehl 1-2

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Chemical Engineering
in
Booth 78

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THE NAME TO WATCH IN CHEMICALS

A PRIME SOURCE OF SUPPLY FOR:

Sodium Sulfonates
Polybutenes
Phthalic Anhydride
Detergents
Gas Odorants
Wetting Agents
Naphthenic Acids
Aliphatic Acid
Cresylic Acids
Lube Oil Additives

ORONITE CHEMICAL COMPANY

38 Sansome Street, San Francisco 4, Calif.
Standard Oil Bldg., Los Angeles 15, Calif.
30 Rockefeller Plaza, New York 20, N.Y.
600 S. Michigan Ave., Chicago 5, Illinois
824 Whitney Bldg., New Orleans 12, La.

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PACIFIC INDUSTRIAL CONFERENCES

Most important of the many activities associated with the Pacific Chemical Exposition are the Pacific Industrial Conferences. Following are the programs of the cooperating organizations. Everyone registering (no fee) at the Pacific Chemical Exposition is welcome to attend any or all of these programs.

AGRICULTURAL AND FOOD CHEMISTRY DIVISION AMERICAN CHEMICAL SOCIETY, CALIFORNIA SECTION

FRIDAY, Nov. 4, Larkin Hall, Civic Auditorium.

Co-Chairmen: RAY H. NAGEL, *Technical Assistant to the Director, U.S.D.A. Laboratory*
JOHN R. MACHETT, *Food Research Coordinator, U.S.D.A. Laboratory.*

ECONOMIC TRENDS IN THE WESTERN FOOD PROCESSING INDUSTRY—

RECENT DEVELOPMENTS IN FOOD CROP PRODUCTION ON THE WEST COAST—S. B. FREEBORN, *Assistant Dean, College of Agriculture, University of California.*

TECHNOLOGICAL TRENDS IN THE FOOD PROCESSING INDUSTRY—

UTILIZATION OF FRUIT AND VEGETABLE CANNERY WASTES—W. B. VANARSDEL, *Assistant Director, Western Regional Research Laboratory.*

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS NORTHERN CALIFORNIA SECTION

WEDNESDAY, Nov. 2, 2:00-5:00 p.m., Larkin Hall, Civic Auditorium.

Chairman:

RECENT DEVELOPMENTS AT THE AMERICAN POTASH & CHEMICAL CORPORATION—RUSSELL W. MUMFORD, *Vice President and Consulting Engineer, American Potash & Chemical Corporation.*

DESIRABLE PERSONAL CHARACTERISTICS FOR TECHNICAL PERSONNEL—ALLAN R. CULLIMORE, *President Emeritus, Newark College of Engineering.*

HISTORY OF CHEMICAL ENGINEERING AS A PROFESSION—W. L. BADGER, *Consulting Engineer.*

DINNER:

NEW APPROACHES TO OLD PROCESSES (Dinner Talk)—W. HIRSCHKIND, *Director of Research, Great Western Division, The Dow Chemical Company.*

FOREST PRODUCTS RESEARCH SOCIETY NORTHERN CALIFORNIA SECTION

FRIDAY, Nov. 4, 1:00-5:00 p.m., Room 409, Civic Auditorium.

Chairman: ROBERT A. COCKRELL, *Professor of Forestry, University of California.*

USES OF REDWOOD IN THE CHEMICAL INDUSTRIES—BYRNE MANSON, *California Redwood Association.*

SURFACE COATINGS AND PRESERVATIVES FOR WOOD—SAM MULLEN, *Monsanto Chemical Company.*

USE OF THE ELECTRON MICROSCOPE IN REVEALING WOOD CELL WALL STRUCTURE—I. FISCHBEIN and A. WILCOX, *U. C. School of Forestry.*

NORTHERN CALIFORNIA INSTRUMENT ASSOCIATION

THURSDAY, Nov. 3, 2:00-5:00 p.m., Room 402, Civic Auditorium.

Chairman: D. J. POMPEO, *Shell Development Company.*

EXTENSION OF ROTAMETER THEORY TO PRACTICAL APPLICATIONS—VIC HEAD, *Fischer and Porter Co.*

SOLIDS FLOW AND LEVEL CONTROL IN THE HYPERSORPTION PROCESS—CLYDE BERG, *Union Oil Company.*

FLUID METERING BY ELECTROMOTIVE FORCE—L. M. GROSSMAN, *University of California.*

INFRARED GAS ANALYZERS FOR PLANT CONTROL—VIGO SMITH, *Shell Development Co.*

INDUSTRIAL APPLICATIONS OF STATHAM TRANSDUCERS—C. A. MOTZ, *Statham Laboratories.*

USE OF INSTRUMENTS IN SUGAR REFINING—T. R. GILLETT, *California and Hawaiian Sugar Refinery Corp., Ltd.*

THURSDAY, Nov. 3, 7:30-9:00 p.m., Room 402, Civic Auditorium.

Chairman: CHET BEARD, *Bechtel Corp.*

POSSIBLE APPLICATION OF PRINTED CIRCUIT AND MINIATURIZATION TECHNIQUE—CLEDO BRUNETTI, *Stanford Research Institute.*

INDUSTRIAL APPLICATIONS OF RADIOACTIVITY—L. R. ZUMWALT, *Tracerlab, Western Division.*

INSTRUMENTATION FOR INDUSTRIAL HYGIENE—O. J. SOBOL, *U. S. Naval Air Station.*

NORTHERN CALIFORNIA RUBBER GROUP and SOCIETY OF THE PLASTICS INDUSTRY SAN FRANCISCO SECTION

FRIDAY, Nov. 4, 1:00-5:00 p.m., Polk Hall, Civic Auditorium.

Chairman: H. J. JORDAN, *E. I. duPont de Nemours & Co.*

REGISTRATION—1:00-2:00 p.m.

INTRODUCTION—H. J. JORDAN, *E. I. duPont de Nemours & Co.*

ENGINEERING OF RUBBER PRODUCTS FOR INDUSTRIAL NEEDS—W. D. GOOD, *Factory Manager, American Rubber Mfg. Co., and Chairman, Northern California Rubber Group.*

RUBBER PRODUCTS MADE IN THE WEST FOR WESTERN INDUSTRIES—F. E. SCHLUETER, *President, Thermoid Company.*

TIRES—Speaker to be announced.

TIRE RECAPPING MATERIALS—GRIFFITH F. OLIVER, *President, Oliver Tire & Rubber Co.*

PLASTICS (The Plastics Business)—H. NORMAN EHRMAN, *Industrial Sales Manager, Remler Company.*

PLASTICS (Industrial Applications)—FERDINAND T. KERELY, *San Francisco Representative of the Society of the Plastic Industry, K-Plastix.*

PLASTICS (Vinyl Plastics Invade the Rubber Field)—G. A. FOWLES, *Sales Manager, Plastic Materials, B. F. Goodrich Chemical Co.*

APPLICATIONS OF NEOPRENE AND COLD RUBBER IN ELECTRICAL CABLE—GENE HEALEY, *Chemist, Western Insulated Wire Inc.*

FRIDAY, Nov. 4, 5:00-8:00 p.m., Hotel Whitcomb.

ASSEMBLY FOR BANQUET—5:00-6:00 p.m.

BANQUET—6:00-8:00 p.m., Hotel Whitcomb.

COMMERCIAL ASPECTS OF COLD RUBBER (Dinner Talk)—LEONARD K. FIRESTONE, *President, Firestone Tire & Rubber Co.*

Continued

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Pacific Industrial Conferences

FRIDAY, Nov. 4, 8:15-9:30 p.m., Polk Hall, Civic Auditorium.

SUBJECT TO BE ANNOUNCED—*Speaker to be announced.*

PANEL DISCUSSION *Chairman:* Ross E. Morris, Sr., Rubber Technologist, Mare Island Navy Yard Rubber Laboratory.

PANEL DISCUSSION—Panel is to be made up of speakers and additional rubber chemists. Questions from the audience will be answered at this time, rather than after each talk.

PACIFIC ASSOCIATION OF CHEMISTRY TEACHERS

FRIDAY, Nov. 4, 9:00 a.m.-12:00 noon, Civic Auditorium.

Chairman:

How Can Colleges and Industry Cooperate to Produce Better Chemists?

Panel of four industrial chemists and three college professors.

FRIDAY, Nov. 4, 1:30-4:30 p.m., Civic Auditorium.

Chairman: Norris W. Rakestraw, *Scripps Institute.*

Symposium on Visual Aids

Topics to be covered will include:
Films for class-room use and their sources
Lecture demonstration illustrating industrial processes
Slides
Film strips
Exhibits available from industries

SATURDAY, Nov. 5, 9:00-11:30 a.m., Civic Auditorium.

Chairman: L. Reed Brantley, *Occidental College.*

BUSINESS MEETING.

SATURDAY, Nov. 5, 12:00 noon, Luncheon, Hotel Whitcomb.

THE FUTURE OF CHEMICAL INDUSTRY IN THE ELEVEN WESTERN STATES (Luncheon Talk)—Frederick G. Sawyer.

SATURDAY, Nov. 5, 2:00 p.m.

FIELD TRIPS—Stanford Research Institute, Microwave Laboratory, and the Stanford Campus.

PACIFIC INSECTICIDE INSTITUTE

THURSDAY, Nov. 3, 1:30-5:00 p.m., Polk Hall, Civic Auditorium.

Chairman: G. F. MacLeod, *Sunland Industries.*

Agricultural Chemicals—A Ten-Year Review

BOTANICALS AS INSECTICIDES—G. S. Hensill, *California Spray Chemical Corp.*

CHLORINATED BENZENOIDS AS INSECTICIDES—C. O. Persing, *Stauffer Chemical Company.*

FUMIGANTS—A. F. Swain, *Eston Chemical Company.*

ACARICIDES—D. B. Scott, *The Sherwin-Williams Company.*

NON-PETROLEUM HERBICIDES—R. N. Raynor, *Great Western Division, The Dow Chemical Company.*

PETROLEUM HERBICIDES AND INSECTICIDES—Lobel G. Smith, *Shell Chemical Company.*

RODENTICIDES—Charles D. Thurmond, *Monsanto Chemical Company.*

CHEMICALS FOR SEED TREATMENT—Merle Ward, E. I. *du Pont de Nemours & Co.*

CHLORINATED NAPTHALENES AS INSECTICIDES—W. F. McCauley, *Julius Hyman & Company.*

DEFOLIANTS—Ralph Beck, *American Cyanamid Company.*

ORGANIC PHOSPHATES AS INSECTICIDES—C. C. Cassil, *Niagara Sprayer Division, Food Machinery Corp.*

FUNGICIDES—I. L. Isenhour, *Rohm & Haas Co.*

FERTILIZERS—Weller Noble, *Pacific Guano Company.*

DISCUSSION.

PETROLEUM DIVISION, AMER. CHEMICAL SOCIETY CALIFORNIA SECTION and AMER. INSTITUTE OF MINING ENGINEERS

TUESDAY, Nov. 1, 1:00-5:00 p.m., Larkin Hall, Civic Auditorium.

Chairman: E. L. Walters, *Shell Development Company.*

The Future of Energy Sources in the Western States

WATER POWER—Lesher Wing, *Regional Engineer, Federal Power Commission.*

COAL—V. F. Parry, *Supervising Engineer, Bureau of Mines.*

LIQUID PETROLEUM—Howard G. Vesper, *President, California Research Corporation.*

OIL SHALE—S. H. McAllister, *Associate Director, Shell Development Company.*

GAS—Roy Wehe, *Consulting Engineer.*

PROTECTIVE COATINGS GROUP

THURSDAY, Nov. 3, 7:30 p.m.

Chairman: Frank A. Leibold, Jr., *Irwin Paint Co.*

SMOOTH SURFACED RESILIENT FLOOR COVERINGS—H. W. Crockett, *Research Department, Paraffine Companies, Inc.*

THE ELECTROPLATING INDUSTRY ON THE WEST COAST—d. Marcum, *Technical Representative, Electro-Chemicals Department, E. I. duPont de Nemours & Co.*

SILICONES FOR THE PROTECTIVE COATING INDUSTRY—John J. Tyner, *Manager, Western Office, Dow Corning Corporation.*

WESTERN CHEMICAL MARKET RESEARCH GROUP

TUESDAY, Nov. 1, 9:15 a.m.-12 noon, Polk Hall, Civic Auditorium.

Chairman:

Symposium: Regional Requirements for Chemicals (by geographical areas)

INTRODUCTORY REMARKS—Speaker to be announced.

PACIFIC NORTHWEST AREA—Speaker to be announced.

COLUMBIA RIVER AREA—Speaker to be announced.

INTERMOUNTAIN AREA—Speaker to be announced.

BAY AREA AND NORTHERN CALIFORNIA—Speaker to be announced.

SOUTHERN CALIFORNIA AREA—Speaker to be announced.

WORLD TRADE SECTION

SAN FRANCISCO CHAMBER OF COMMERCE

TUESDAY, Nov. 1, 12:00 noon, Luncheon.

Chairman:

THE WESTERN CHEMICAL INDUSTRY IN THE WORLD PICTURE (Luncheon Talk)—L. I. Doan, *President, The Dow Chemical Company.*

TUESDAY, Nov. 1, 2:00-4:30 p.m., Polk Hall, Civic Auditorium.

Chairman:

EXPORT MARKETS FOR WESTERN CHEMICALS—Speaker to be announced.

REVIEW OF CURRENT WORLD CHEMICAL DEVELOPMENTS—Speaker to be announced.

DISCUSSION—Panel Members: (To be announced).

WEDNESDAY, Nov. 2, 9:30-11:45 a.m., Polk Hall, Civic Auditorium.

Chairman:

Processing Imports by the Western Chemical Industry

IMPORTS CAPABLE OF WESTERN PROCESSING—Speaker to be announced

FACTORS AFFECTING PROCESSING OF IMPORTS AND MARKETING WESTERN PRODUCTION:

(Manufacturing Costs)—Speaker to be announced.
(Freight Rates)—Speaker to be announced.
(Distribution Problems)—Speaker to be announced.

DISCUSSION—Panel Members: (To be announced).

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BEMIS paper bags for chemicals

As one of America's largest producers of multiwalls and other paper bags, Bemis naturally makes many types to serve varied packaging requirements.

For the chemical industry, several types of construction are produced. The paper bags most generally used are shown here.

Note the variety of the Bemis line when you are buying paper bags for chemicals. It gives you wider choice in quality bags from a single source.

Bemis

Peoria, Ill. • East Pepperell, Mass. • Mobile, Ala. • Houston, Texas
San Francisco, Calif. • Vancouver, Wash. • Wilmington, Calif.

Baltimore • Boise • Boston • Brooklyn • Buffalo • Charlotte • Chicago • Cleveland • Denver
Detroit • Indianapolis • Jacksonville, Fla. • Kansas City • Los Angeles • Louisville • Memphis
Minneapolis • New Orleans • New York City • Norfolk • Oklahoma City • Omaha • Phoenix
Pittsburgh • St. Louis • Salina • Salt Lake City • Seattle • Wichita

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PRODUCT CLASSIFICATION OF EXHIBITORS WITH BOOTH NUMBERS

ABRASIVES
Monsanto Chemical Company (102-103-104)

ABSORBENTS
Carbide and Carbon Chemicals Corporation (27)
Monsanto Chemical Company (102-103-104)

ABSORBERS
Haveg Corporation (10)
Southwestern Engineering Company (33)
Tracerlab, Inc. (82)

ACID HANDLING EQUIPMENT
Fernholtz Machinery Co. (36-37)
Fischer & Porter Company (215)
Haveg Corporation (10)
Jack Stiehl Co. (1-2)
W. S. Shamban & Co. (217)
Tri-Clover Machine Co. (72)

ACID RESISTING MATERIALS
Duraметallic Corporation (38)
Electric Steel Foundry (56-57)
Haveg Corporation (10)
Jack Stiehl Co. (1-2)
Nurnberg Thermometer Co., Inc. (26)
Pacific Coast Rubber Company (38)
W. S. Shamban & Co. (217)
Tri-Clover Machine Co. (72)

ACIDS, Inorganic
American Cyanamid Company (92)
The Dow Chemical Company (53-54-55)
A. R. Maas Chemical Co. (71)
Monsanto Chemical Company (102-103-104)

ACIDS, Organic
American Cyanamid Company (92)
Carbide and Carbon Chemicals Corporation (27)
Commercial Solvents Corporation (66)
The Dow Chemical Company (53-54-55)
Monsanto Chemical Company (102-103-104)
Oronite Chemical Company (73)

ACRYLONITRILE
American Cyanamid Company (92)
Carbide and Carbon Chemicals Corporation (27)

ADHESIVES
Monsanto Chemical Company (102-103-104)
Philadelphia Quartz Company of California (4)
Shell Chemical Corporation (84-85)

ALCOHOLS
Braun-Knecht-Heimann Co. (52)
Carbide and Carbon Chemicals Corporation (27)
Commercial Solvents Corporation (66)
Monsanto Chemical Company (102-103-104)
Shell Chemical Corporation (84-85)

ALCOHOLS, Polyhydric
Carbide and Carbon Chemicals Corporation (27)
The Dow Chemical Company (53-54-55)
Shell Chemical Corporation (84-85)

ALKALIES
American Cyanamid Company (92)
Braun-Knecht-Heimann Co. (52)
The Dow Chemical Co. (53-54-55)
A. R. Maas Chemical Co. (71)
Monsanto Chemical Company (102-103-104)
Philadelphia Quartz Company of California (4)

ALLOYS, Ferrous
Electric Steel Foundry (56-57)
Jack Stiehl Co. (1-2)

ALLOYS, Non-Ferrous
The Dow Chemical Company (53-54-55)
Electric Steel Foundry (56-57)
Jack Stiehl Co. (1-2)
Tri-Clover Machine Co. (72)

ALUMINUM AND ALLOYS
Tri-Clover Machine Co. (72)

AMIDES
Carbide and Carbon Chemicals Corporation (27)
The Dow Chemical Company (53-54-55)

AMINES
Carbide and Carbon Chemicals Corporation (27)
Commercial Solvents Corporation (66)
The Dow Chemical Company (53-54-55)

AMINO ACIDS
The Dow Chemical Company (53-54-55)

AMMONIA
Braun-Knecht-Heimann Co. (52)
Commercial Solvents Corporation (66)
The Dow Chemical Company (53-54-55)
Monsanto Chemical Company (102-103-104)
Shell Chemical Corporation (84-85)
Spencer Chemical Company (83)

ANALYTICAL REAGENTS
Braun-Knecht-Heimann Co. (52)
W. M. Welch Manufacturing Company (5-6)

ANODES
Braun-Knecht-Heimann Co. (52)
The Dow Chemical Company (53-54-55)

ANTIOXIDANTS
Monsanto Chemical Company (102-103-104)
Shell Chemical Corporation (84-85)

AROMATICS
Braun-Knecht-Heimann Co. (52)
The Dow Chemical Company (53-54-55)
Monsanto Chemical Company (102-103-104)

AROMATICS—Heavy
Oronite Chemical Company (73)

ASBESTOS
Enzinger Union Corp. (64)
Haveg Corporation (10)
National Tank & Mfg. Co. (64)

AUTOCLAVES
Enzinger Union Corp. (64)
Fernholtz Machinery Co. (36-37)
National Tank & Mfg. Co. (64)
W. S. Shamban & Co. (217)

BAGS—See Containers and Packages

BLOWERS—See Fans

BOOKS, Technical
J. W. Stacey, Inc. (216)

BOTTLING EQUIPMENT—See Packaging Equipment

BROMINE
The Dow Chemical Company (53-54-55)

CALCINERS
Hardinge Company Inc. (210)

CARBON
Monsanto Chemical Company (102-103-104)
Shell Chemical Corporation (84-85)
Tracerlab, Inc. (82)

CARBON, Activated
Braun-Knecht-Heimann Co. (52)
Carbide and Carbon Chemicals Corporation (27)
The Dow Chemical Company (53-54-55)

CARBON—Tubing and Shapes

CASEIN AND DERIVATIVES
American Cyanamid Company (92)

CASTINGS
Cooper Alloy Foundry Co. (75)
The Dow Chemical Company (53-54-55)
Walter L. Duhig & Co. (75-76)
Electric Steel Foundry (56-57)
Jack-Stiehl Co. (1-2)

CATALYSTS
American Cyanamid Company (92)
Antara Products, General Aniline & Film Corp. (68)
Monsanto Chemical Company (102-103-104)
Oronite Chemical Company (73)
Shell Chemical Corporation (84-85)

CELLULOSE AND DERIVATIVES
The Dow Chemical Company (53-54-55)
Monsanto Chemical Company (102-103-104)

CEMENT
Haveg Corporation (10)
Jack-Stiehl Co. (1-2)

CENTRIFUGALS
Nurnberg Thermometer Co., Inc. (26)
Tri-Clover Machine Co. (72)

CERAMIC AND PORCELAIN EQUIPMENT
Fernholtz Machinery Co. (36-37)
Fischer & Porter Company (215)
Hardinge Company Inc. (210)

CHEMICAL ENGINEERS
Cameron Iron Works, Inc. (201)
Southwestern Engineering Company (33)

CHEMICAL PLANT EQUIPMENT
Cameron Iron Works, Inc. (201)
Cooper Alloy Foundry Co. (75)
Walter L. Duhig & Co. (75-76)
Duraметallic Corporation (38)
Enzinger Union Corp. (64)
Fernholtz Machinery Co. (36-37)
Fischer & Porter Company (215)
George R. Friederich & Co. (11-12)
Hardinge Company Inc. (210)
Haveg Corporation (10)
Jack-Stiehl Co. (1-2)
Monsanto Chemical Company (102-103-104)
National Tank & Mfg. Co. (64)
Niagara Filter Corporation (14)
Nurnberg Thermometer Co., Inc. (26)
Pacific Coast Rubber Company (38)
W. S. Shamban & Co. (217)
Southwestern Engineering Co. (33)
The Watson-Stillman Co. (76)

CHEMICAL RESEARCH
Carbide and Carbon Chemicals Corporation (27)
Tracerlab Inc. (82)

CHEMICALS, Agricultural
American Cyanamid Company (92)
The Dow Chemical Company (53-54-55)
Monsanto Chemical Company (102-103-104)
Shell Chemical Corporation (84-85)
Spencer Chemical Company (83)

Continued

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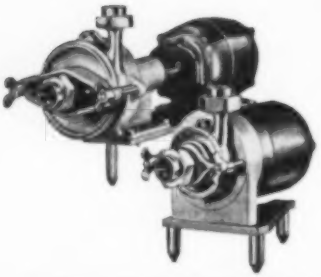

SPECIALTY
Sanitary
Centrifugal Pumps

Peak performance is the prime purpose of these precision-built centrifugal pumps . . . outstandingly efficient units for chemical processors. Moving liquid chemicals becomes a cinch because of the three-bladed single piece impeller that won't cause churning or foaming. Beautifully designed, completely sanitary, easy to take apart and clean up. Ask for interesting Nofome and Streamflo Pump Bulletin 9C.

Sanitary Product-Handling Equipment is a SPECIALTY *Business*

SPECIALTY BRASS COMPANY

Kenosha • Wisconsin

You can "feel" the built-in superiority of SPECIALTY Sanitary Valves and Fittings. Every detail is precisely machined and highly polished to an exacting finish. That's why take-down and clean-up time are a snap. Made from stainless steel or nickel alloy to meet rigid code requirements. Specify SPECIALTY . . . over forty years the leading source of sanitary fittings. Complete details in Catalog 2F8.

SPECIALTY
Sanitary FITTINGS

EXHIBITORS • Classified by Products • CONTINUED

CHEMICALS FROM FATS
Braun-Knecht-Heimann Co. (52)
Carbide and Carbon Chemicals Corporation (27)

CHEMICALS, Fine
Braun-Knecht-Heimann Co. (52)
Carbide and Carbon Chemicals Corporation (27)
The Dow Chemical Company (53–54–55)
Monsanto Chemical Company (102–103–104)
Shell Chemical Corporation (84–85)

CHEMICALS, Food
Braun-Knecht-Heimann Co. (52)
Carbide and Carbon Chemicals Corporation (27)
A. R. Maas Chemical Co. (71)
Monsanto Chemical Company (102–103–104)

CHEMICALS, Industrial-Inorganic
American Cyanamid Company (92)
Braun-Knecht-Heimann Co. (52)
Carbide and Carbon Chemicals Corporation (27)
The Dow Chemical Company (53–54–55)
Los Angeles Chemical Company (81)
A. R. Maas Chemical Co. (71)
Monsanto Chemical Company (102–103–104)
Philadelphia Quartz Company of California (4)
Spencer Chemical Company (83)

CHEMICALS, Industrial-Organic
American Cyanamid Company (92)
Braun-Knecht-Heimann Co. (52)
Carbide and Carbon Chemicals Corporation (27)
Commercial Solvents Corporation (66)
The Dow Chemical Company (53–54–55)
Monsanto Chemical Company (102–103–104)
Oronite Chemical Company (73)
Shell Chemical Corporation (84–85)

CHEMICALS, Laboratory
Braun-Knecht-Heimann Co. (52)
Carbide and Carbon Chemicals Corporation (27)
Central Scientific Company (39–40)
Monsanto Chemical Company (102–103–104)
Nurnberg Thermometer Co., Inc. (26)
W. M. Welch Manufacturing Company (5–6)

CHEMICALS, Leather
American Cyanamid Company (92)
Braun-Knecht-Heimann Co. (52)
Carbide and Carbon Chemicals Corporation (27)
Commercial Solvents Corporation (66)
Los Angeles Chemical Company (81)
A. R. Maas Chemical Co. (71)
Monsanto Chemical Company (102–103–104)
Oronite Chemical Company (73)

CHEMICALS, Paint
American Cyanamid Company (92)
Braun-Knecht-Heimann Co. (52)
Carbide and Carbon Chemicals Corporation (27)
Commercial Solvents Corporation (66)
Monsanto Chemical Company (102–103–104)
Oronite Chemical Company (73)
Shell Chemical Corporation (84–85)

CHEMICALS, Pharmaceutical
American Cyanamid Company (92)
Braun-Knecht-Heimann Co. (52)
Carbide and Carbon Chemicals Corporation (27)
The Dow Chemical Company (53–54–55)
Commercial Solvents Corporation (66)
Monsanto Chemical Company (102–103–104)
Shell Chemical Corporation (84–85)

CHEMICALS, Photographic
American Cyanamid Company (92)
Braun-Knecht-Heimann Co. (52)
Carbide and Carbon Chemicals Corporation (27)
Commercial Solvents Corporation (66)
A. R. Maas Chemical Co. (71)

CHEMICALS, Plastics
American Cyanamid Company (92)
Braun-Knecht-Heimann Co. (52)
Carbide and Carbon Chemicals Corporation (27)
Commercial Solvents Corporation (66)
The Dow Chemical Company (53–54–55)
Monsanto Chemical Company (102–103–104)
Oronite Chemical Company (73)
Shell Chemical Corporation (84–85)

CHEMICALS, Textile
American Cyanamid Company (92)
Braun-Knecht-Heimann Co. (52)
Carbide and Carbon Chemicals Corporation (27)
Commercial Solvents Corporation (66)
A. R. Maas Chemical Co. (71)
Monsanto Chemical Company (102–103–104)
Oronite Chemical Company (73)

CHLORHYDRINS
Carbide and Carbon Chemicals Corporation (27)
The Dow Chemical Company (53–54–55)
Shell Chemical Corporation (84–85)

CHLORINE
Braun-Knecht-Heimann Co. (52)
The Dow Chemical Company (53–54–55)
Monsanto Chemical Company (102–103–104)

CLARIFIERS
Braun-Knecht-Heimann Co. (52)
Enzinger Union Corp. (64)
National Tank & Mfg. Co. (64)

CLASSIFIERS
Enzinger Union Corp. (64)
National Tank & Mfg. Co. (64)

COAL CHEMICALS
Braun-Knecht-Heimann Co. (52)

COATINGS
The Dow Chemical Company (53–54–55)
Haveg Corporation (10)
Jack Stiehl Co. (1–2)
Monsanto Chemical Company (102–103–104)

COLLOID MILLS
Fernholtz Machinery Co. (36–37)
W. S. Shamban & Co. (217)

COLORS
American Cyanamid Company (92)
Braun-Knecht-Heimann Co. (52)
Los Angeles Chemical Company (81)

COMPLETE CHEMICAL PLANTS
Enzinger Union Corp. (64)
Haveg Corporation (10)
National Tank & Mfg. Co. (64)
Southwestern Engineering Company (33)

CONDENSERS AND COOLERS
Cooper Alloy Foundry Co. (75)
Walter L. Duhig & Co. (75–76)
Enzinger Union Corp. (64)
Hardinge Company Inc. (210)
Haveg Corporation (10)

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VIRTUALLY UNBREAKABLE!

So strong that the pH-sensitive bulb can withstand as much pressure as the thick stem itself!

Abrasion resistant — unusually rugged for long life and reliable measurement even in highly abrasive slurries!

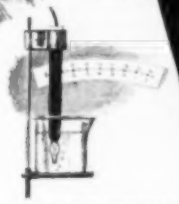
Chemical durability — excellent in the strongest acids and alkalis . . . even at elevated temperatures!

COVER EXTREME TEMPERATURES!

30° to 130° C at high pH — with the new high temperature—high pH glass.

—20° to 100° C — with the new general-purpose glass. Will withstand even repeated freezing.

Now- NEW BECKMAN pH Electrodes



UNPRECEDENTED pH RANGE!

0 to 14 pH — with the high-temperature high-pH glass . . . *only small reproducible deviation near extreme limits, even at high temperatures.*

0 to 11 pH — at room temperature and 0 to 10 pH at boiling for the general-purpose glass . . . *without correction for sodium ions!*

IMPROVED CONSTRUCTION!

Simplified, heat-resistant construction eliminates wax filling . . . retains patented Beckman internal shielding . . . increases measurement precision.

Only *Beckman Glass Electrodes* offer all of these features:

▸ **RAPID RESPONSE** . . . accuracy with speed and convenience.

▸ **STABILITY** . . . to match the high precision of BECKMAN pH METERS.

▸ **INTERNAL SHIELDING** . . . gives complete freedom from outside electrostatic interference.

▸ **INTEGRAL LEADS** . . . Continuous insulation into the electrode . . . connections located on protected panel board.

▸ **EXTREME TEMPERATURE RANGE** . . . Several types permit use from below freezing to boiling *and above!*

▸ **ENTIRE pH SCALE** . . . *Very small* sodium ion errors . . . e.g., with high-temperature high-pH glass, only 0.2 pH deviation at 13.7 pH in 1 N sodium hydroxide.

▸ **FACTORY SEALED** . . . rigidly tested . . . no maintenance.

▸ **UNIQUE CHEMICAL DURABILITY** . . . in alkali . . . in acid . . . in dilute solutions.

And . . . *REALLY TOUGH* . . . can even be used as a stirring rod!

These new electrode glasses are now being used in several Beckman electrode styles. As rapidly as possible, they will be available in the full line of Beckman Glass Electrodes.

Constant Research over the years has maintained Beckman Leadership in the instrumentation field . . .

—Beckman pH Meters and Glass Electrodes
—Beckman Ultraviolet, Visible and Infrared Spectrophotometers
—Beckman Radioactivity Meters and Special Instruments . . . Unsurpassed for Reliability!

BECKMAN INSTRUMENTS
control modern industries

BECKMAN INSTRUMENTS • National Technical Laboratories, South Pasadena 14 California

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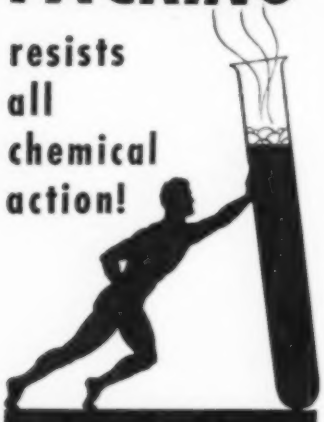
TEFLON PACKING

resists all chemical action!



PREVENTS COSTLY SHUTDOWNS!

Teflon Packing, with spacers of pure Teflon, is a tough, resilient product for valves and pumps. Chemically resistant it is guaranteed to cut your maintenance and shutdown costs, because it lasts years longer than any conventional packing.

Non-porous Teflon Packing is not affected by corrosive materials nor solvents, withstands temperatures of from minus 118° to 525 degrees F.

The Koppers Company has Worthington Worthite pumps to handle fuming sulphuric acid. They used conventional packing, had to repack every two days. Then in December 1947 the pumps were packed with TEFLON—and haven't needed repacking SINCE!

Use Style Z101 (graphite base) on all except stainless steel valves and pumps. On stainless steel use Z201 (mica base). We also make Teflon covered gaskets, and welcome inquiries about unusual shapes and custom-built items.

REPRESENTATIVES:

Northern California
The Jack-Stiehl Co.
605 Addison Street
Berkeley 10, Cal.

Southern California
W. S. Shamban & Co.
2363 E. 38th Street
Los Angeles, 11, Cal.

POWER PRODUCTS CO.
11 Broadway, N. Y. 4, N. Y.

EXHIBITORS • Classified by Products • CONTINUED

Jack-Stiehl Co. (1-2)
National Tank & Mfg. Co. (64)
W. S. Shamban & Co. (217)
Southwestern Engineering Company (33)

CONTAINERS AND PACKAGES
Bemis Bro. Bag Co. (74)
Continental Can Company, Inc. (77)
Monsanto Chemical Company (102-103-104)
Tracerlab, Inc. (82)

CONTROLLERS AND CONTROL SYSTEMS
Enzinger Union Corp. (64)
Fischer & Porter Company (215)
George R. Friederich & Co. (11-12)
National Tank & Mfg. Co. (64)

COOKERS—See Digestors

COOLERS—See Condensers

CORROSION RESISTANT MATERIALS
Cooper Alloy Foundry Co. (75)
Walter L. Duhig & Co. (75-76)
Durametallic Corporation (38)
Electric Steel Foundry (56-57)
Haveg Corporation (10)
Jack Stiehl Co. (1-2)
Nurnberg Thermometer Co., Inc. (26)
Pacific Coast Rubber Company (38)
Philadelphia Quartz Company of California (4)
W. S. Shamban & Co. (217)
Tri-Clover Machine Co. (72)
The Watson-Stillman Co. (76)

CRESOLS
Monsanto Chemical Company (102-103-104)

CRUSHERS, GRINDS, MILLS AND PULVERIZERS
Braun-Knecht-Heimann Co. (52)
Fernholtz Machinery Co. (36-37)
Hardinge Co., Inc. (210)
Jack-Stiehl Co. (1-2)

DECOLORIZING AND PURIFYING MATERIALS
Braun-Knecht-Heimann Co. (52)
Los Angeles Chemical Company (81)

DESICCANTS
Braun-Knecht-Heimann Co. (52)
The Dow Chemical Company (53-54-55)
George R. Friederich & Co. (11-12)
Jack-Stiehl Co. (1-2)
Monsanto Chemical Company (102-103-104)

DETERGENTS
American Cyanamid Company (92)
Antara Products, General Aniline & Film Corp. (68)
Braun-Knecht-Heimann Co. (52)
Carbide and Carbon Chemicals Corporation (27)
A. R. Maas Chemical Co. (71)
Monsanto Chemical Company (102-103-104)
Oronite Chemical Company (73)
Philadelphia Quartz Company of California (4)
Shell Chemical Corporation (84-85)

DIGESTORS AND COOKERS
Enzinger Union Corp. (64)
Haveg Corporation (10)
National Tank & Mfg. Co. (64)
W. S. Shamban & Co. (217)

DISINFECTANTS AND DISINFECTANT BASES
Braun-Knecht-Heimann Co. (52)
The Dow Chemical Company (53-54-55)
Monsanto Chemical Company (102-103-104)
Oronite Chemical Company (73)

DISTILLING EQUIPMENT
Enzinger Union Corp. (64)
Haveg Corporation (10)
National Tank & Mfg. Co. (64)
Southwestern Engineering Company (33)

DRYING EQUIPMENT
Enzinger Union Corp. (64)
Hardinge Co., Inc. (210)
Haveg Corporation (10)
Jack-Stiehl Co. (1-2)
National Tank & Mfg. Co. (64)

DUST COLLECTING SYSTEMS
Fernholtz Machinery Co. (36-37)
Specialty Sales Company (23)

DYES AND INTERMEDIATES
American Cyanamid Company (92)
The Dow Chemical Company (53-54-55)
Monsanto Chemical Company (102-103-104)

EJECTORS
Haveg Corporation (10)

ELECTRICAL EQUIPMENT AND SUPPLIES
Fischer & Porter Company (215)
Nurnberg Thermometer Co., Inc. (26)

ELECTROPLATING EQUIPMENT AND SUPPLIES
Haveg Corporation (10)

EMULSIFIERS
Antara Products, General Aniline & Film Corp. (68)
Carbide and Carbon Chemicals Corporation (27)
Commercial Solvents Corporation (66)
The Dow Chemical Company (53-54-55)
Oronite Chemical Company (73)
W. S. Shamban & Co. (217)

ENGINEERS
Electric Steel Foundry (56-57)
Enzinger Union Corp. (64)
Fernholtz Machinery Co. (36-37)
Jack-Stiehl Co. (1-2)
National Tank & Mfg. Co. (64)
Southwestern Engineering Company (33)

ESTERS
Carbide and Carbon Chemicals Corporation (27)
The Dow Chemical Company (53-54-55)

ETHERS
Carbide and Carbon Chemicals Corporation (27)
Commercial Solvents Corporation (66)
The Dow Chemical Company (53-54-55)
Monsanto Chemical Company (102-103-104)
Shell Chemical Corporation (84-85)

EVAPORATORS
Enzinger Union Corp. (64)
Haveg Corporation (10)
Jack Stiehl Co. (1-2)
National Tank & Mfg. Co. (64)
Southwestern Engineering Company (33)

EXHAUSTERS—See Fans

EXPLOSIVES
American Cyanamid Company (92)

EXTRACTION EQUIPMENT
Hardinge Co., Inc. (210)

FANS, BLOWERS AND EXHAUSTERS
Enzinger Union Corp. (64)
Haveg Corporation (10)
Jack Stiehl Co. (1-2)
National Tank & Mfg. Co. (64)

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EXHIBITORS • Classified by Products • CONTINUED

FILLING EQUIPMENT—See Packaging Equipment

FILTER MEDIA
Enzinger Union Corp. (64)
Fernholtz Machinery Co. (36–37)
National Tank & Mfg. Co. (64)
Niagara Filter Corporation (14)
Santa Fe Tank & Tower Company (8)
W. S. Shamban & Co. (217)
Specialty Sales Company (23)

FILTERS AND FILTER PRESSES
Commercial Filters Corporation (80)
Enzinger Union Corp. (64)
George R. Friederich & Co. (11–12)
Haveg Corporation (10)
Jack-Stiehl Co. (1–2)
National Tank & Mfg. Co. (64)
Niagara Filter Corporation (14)
Santa Fe Tank & Tower Company (8)
Specialty Sales Company (23)

FIRE AND FLAMEPROOFING MATERIALS
Monsanto Chemical Company (102–103–104)

FITTINGS, Valve and Pipe
Cameron Iron Works, Inc. (201)
Cooper Alloy Foundry Co. (75)
Walter L. Duhig & Co. (75–76)
Durametallic Corporation (38)
Electric Steel Foundry (56–57)
Enzinger Union Corp. (64)
George R. Friederich & Co. (11–12)
Haveg Corporation (10)
Jack-Stiehl Co. (1–2)
National Tank & Mfg. Co. (64)
Nurnberg Thermometer Co., Inc. (26)
Pacific Coast Rubber Company (38)
Santa Fe Tank & Tower Company (8)
Tri-Clover Machine Co. (72)
The Watson-Stillman Co. (76)

FLOTATION AGENTS
American Cyanamid Company (92)
Carbide and Carbon Chemicals Corporation (27)
The Dow Chemical Company (53–54–55)
A. R. Maas Chemical Co. (71)
Oronite Chemical Company (73)
Shell Chemical Corporation (84–85)

FLOTATION MACHINES
American Cyanamid Company (92)
Enzinger Union Corp. (64)
National Tank & Mfg. Co. (64)

FOOD PROCESSING EQUIPMENT
Enzinger Union Corp. (64)
Fernholtz Machinery Co. (36–37)
Haveg Corporation (10)
Jack-Stiehl Co. (1–2)
National Tank & Mfg. Co. (64)
Niagara Filter Corporation (14)
W. S. Shamban & Co. (217)

FORMATES
Commercial Solvents Corporation (66)

FUNGICIDES
American Cyanamid Company (92)
Carbide and Carbon Chemicals Corporation (27)
The Dow Chemical Company (53–54–55)
Los Angeles Chemical Company (81)
Monsanto Chemical Company (102–103–104)
Oronite Chemical Company (73)
Shell Chemical Corporation (84–85)

FURNACES
Fernholtz Machinery Co. (36–37)
K. H. Huppert Co. (205)
Nurnberg Thermometer Co., Inc. (26)

GAS HANDLING EQUIPMENT
Fernholtz Machinery Co. (36–37)
Fischer & Porter Company (215)
Haveg Corporation (10)
Jack-Stiehl Co. (1–2)
Southwestern Engineering Company (33)

GASES
The Dow Chemical Company (53–54–55)

GASKETS
Durametallic Corporation (38)
Jack-Stiehl Co. (1–2)
Pacific Coast Rubber Company (38)
W. S. Shamban & Co. (217)

GAUGES
Cameron Iron Works, Inc. (201)
Enzinger Union Corp. (64)
George R. Friederich & Co. (11–12)
National Tank & Mfg. Co. (64)
Nurnberg Thermometer Co., Inc. (26)
W. M. Welch Manufacturing Company (5–6)

GERMICIDES
Commercial Solvents Corporation (66)
The Dow Chemical Company (53–54–55)
Monsanto Chemical Company (102–103–104)

GLASS, Optical
Central Scientific Company (39–40)
Fischer & Porter Company (215)

GLASS PIPE
Fischer & Porter Company (215)

GLASSWARE, Industrial
Fischer & Porter Company (215)

GLASSWARE, Laboratory
Braun-Knecht-Heimann Co. (52)
Central Scientific Company (39–40)
Fischer & Porter Company (215)
Kimble Glass, Division of Owens-Illinois Glass Company (62)
Los Angeles Chemical Company (81)
Nurnberg Thermometer Co., Inc. (26)
Owens-Illinois Glass Company, Kimble Glass Division (62)
Scientific Service, Inc. (219)
W. M. Welch Manufacturing Company (5–6)

GLYCERINE AND DERIVATIVES
Shell Chemical Corporation (84–85)

GLYCOLS—See Alcohols, Polyhydric

GRINDERS—See Crushers

HALIDES
The Dow Chemical Company (53–54–55)

HALO—AROMATICS
The Dow Chemical Company (53–54–55)

HALOGENS
The Dow Chemical Company (53–54–55)

HEAT TRANSFER AGENTS
Braun-Knecht-Heimann Co. (52)
Carbide and Carbon Chemicals Corporation (27)
The Dow Chemical Company (53–54–55)
Enzinger Union Corp. (64)
Monsanto Chemical Company (102–103–104)
National Tank & Mfg. Co. (64)

HEATERS AND HEAT EXCHANGERS
Cooper Alloy Foundry Co. (75)
Walter L. Duhig & Co. (75–76)
Enzinger Union Corp. (64)
Haveg Corporation (10)
Jack-Stiehl Co. (1–2)
National Tank & Mfg. Co. (64)
Nurnberg Thermometer Co., Inc. (26)
W. S. Shamban & Co. (217)
Southwestern Engineering Company (33)
Walker-Wallace, Inc. (46)

HERBICIDES
Shell Chemical Corporation (84–85)

HIGH VACUUM EQUIPMENT
Central Scientific Company (39–40)
Enzinger Union Corp. (64)
Haveg Corporation (10)
National Tank & Mfg. Co. (64)
Nurnberg Thermometer Co., Inc. (26)
W. M. Welch Manufacturing Company (5–6)

HOISTS
Fernholtz Machinery Co. (36–37)

HOMOGENIZERS, Industrial
W. S. Shamban & Co. (217)

HYDROCARBON GASES
Carbide and Carbon Chemicals Corporation (27)

HYDROCARBONS
Braun-Knecht-Heimann Co. (52)
Carbide and Carbon Chemicals Corporation (27)
Shell Chemical Corporation (84–85)
Tracerlab, Inc. (82)

HYDROGEN ION APPARATUS—See pH Equipment

HYDROXYLAMINES
Commercial Solvents Corporation (66)
The Dow Chemical Company (53–54–55)

INDUSTRIAL RESEARCH
Monsanto Chemical Company (102–103–104)
Tracerlab, Inc. (82)

INHIBITORS
Braun-Knecht-Heimann Co. (52)
Monsanto Chemical Company (102–103–104)

INSECTICIDES AND BASES
American Cyanamid Company (92)
Braun-Knecht-Heimann Co. (52)
Carbide and Carbon Chemicals Corporation (27)
Commercial Solvents Corporation (66)
The Dow Chemical Company (53–54–55)
Los Angeles Chemical Company (81)
Monsanto Chemical Company (102–103–104)
Shell Chemical Corporation (84–85)

INSTRUMENTS, Electrical-Industrial
Fischer & Porter Company (215)
Tracerlab, Inc. (82)
W. M. Welch Manufacturing Company (5–6)

INSTRUMENTS, Electrical-Laboratory
Braun-Knecht-Heimann Co. (52)
Central Scientific Company (39–40)
Fischer & Porter Company (215)
Nurnberg Thermometer Co., Inc. (26)
Scientific Service, Inc. (219)
W. M. Welch Manufacturing Company (5–6)

INSTRUMENTS, Optical
American Optical Company, Scientific Instrument Division (42)
Nurnberg Thermometer Co., Inc. (26)
W. M. Welch Manufacturing Company (5–6)

INSTRUMENTS, Radiation
National Technical Laboratories (24–25)
Scientific Service, Inc. (219)
Tracerlab, Inc. (82)

INSTRUMENTS, Repairing
Nurnberg Thermometer Co., Inc. (26)

Continued

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EXHIBITORS
Classified by Products

INSTRUMENTS. Scientific-Laboratory
American Optical Company, Scientific Instrument Division (42)
Braun-Knecht-Heimann-Co. (52)
Central Scientific Company (39-40)
Fischer & Porter Company (215)
International Instrument Co. (41)
National Technical Laboratories (24-25)
Nurnberg Thermometer Co., Inc. (26)
Scientific Service, Inc. (219)
Tracerlab, Inc. (82)
W. M. Welch Manufacturing Company (5-6)

INSTRUMENTS. Testing
Braun-Knecht-Heimann-Co. (52)
National Technical Laboratories (24-25)

ION EXCHANGE EQUIPMENT
Braun-Knecht-Heimann-Co. (52)
Scientific Service, Inc. (219)

ION EXCHANGE RESINS
American Cyanamid Company (92)
Braun-Knecht-Heimann-Co. (52)
Carbide and Carbon Chemicals Corporation (27)
The Dow Chemical Company (53-54-55)
Monsanto Chemical Company (102-103-104)
Scientific Service, Inc. (219)

JOINTS. Flexible
Chiksan Company (58)
Nurnberg Thermometer Co., Inc. (26)

KETONES
Carbide and Carbon Chemicals Corporation (27)
Monsanto Chemical Company (102-103-104)
Shell Chemical Corporation (84-85)

KETTLES
Enzinger Union Corp. (64)
Fernholtz Machinery Co. (36-37)
Haveg Corporation (10)
Jack-Stiehl Co. (1-2)
National Tank & Mfg. Co. (64)
W. S. Shamban & Co. (217)
Southwestern Engineering Company (33)

KILNS
Enzinger Union Corp. (64)
Fernholtz Machinery Co. (36-37)
Hardinge Company Inc. (210)
National Tank & Mfg. Co. (64)
Southwestern Engineering Company (33)

LABORATORIES. Testing
Braun-Knecht-Heimann-Co. (52)

LABORATORY APPARATUS AND SUPPLIES
Braun-Knecht-Heimann-Co. (52)
Central Scientific Company (39-40)
Duranetallic Corporation (38)
Enzinger Union Corp. (64)
Kimble Glass, Division of Owens-Illinois Glass Company (62)
Los Angeles Chemical Company (81)
National Tank & Mfg. Co. (64)
Nurnberg Thermometer Co., Inc. (26)
Owens-Illinois Glass Company, Kimble Glass Division (62)
Pacific Coast Rubber Company (38)
Scientific Service, Inc. (219)
Specialty Sales Company (23)
W. M. Welch Manufacturing Company (5-6)

LABORATORY FURNITURE
Braun-Knecht-Heimann-Co. (52)
Jack-Stiehl Co. (1-2)
Nurnberg Thermometer Co., Inc. (26)
Scientific Service, Inc. (219)
W. M. Welch Manufacturing Company (5-6)

LACQUERS AND BASES
Carbide and Carbon Chemicals Corporation (27)
The Dow Chemical Company (53-54-55)
Monsanto Chemical Company (102-103-104)

LEAK DETECTORS
Nurnberg Thermometer Co., Inc. (26)

LININGS. Corrosion Resistant
Haveg Corporation (10)
Jack-Stiehl Co. (1-2)
Nurnberg Thermometer Co., Inc. (26)

LUBRICANT ADDITIVES
American Cyanamid Company (92)
Carbide and Carbon Chemicals Corporation (27)
Monsanto Chemical Company (102-103-104)
Oronite Chemical Company (73)
Shell Chemical Corporation (84-85)

LUBRICANTS
Carbide and Carbon Chemicals Corporation (27)

MACHINERY. Processing
Enzinger Union Corp. (64)
Fernholtz Machinery Co. (36-37)
Hardinge Company Inc. (210)
Jack-Stiehl Co. (1-2)
National Tank & Mfg. Co. (64)
W. S. Shamban & Co. (217)

MAGNESIUM AND ALLOYS
The Dow Chemical Company (53-54-55)

MAGNETIC EQUIPMENT
Fernholtz Machinery Co. (36-37)
Fischer & Porter Company (215)

MANOMETERS
Braun-Knecht-Heimann-Co. (52)
Nurnberg Thermometer Co., Inc. (26)
W. M. Welch Manufacturing Company (5-6)

MATERIALS HANDLING EQUIPMENT
Fernholtz Machinery Co. (36-37)
Scientific Service, Inc. (219)
Tracerlab, Inc. (82)

METALLURGICAL RESEARCH
Braun-Knecht-Heimann-Co. (52)
Southwestern Engineering Company (33)
Tracerlab, Inc. (82)

METALS AND ALLOYS
Electric Steel Foundry (56-57)
Jack-Stiehl Co. (1-2)

METERS. Indicating and Recording
Enzinger Union Corp. (64)
Fischer & Porter Company (215)
K. H. Huppert Co. (205)
National Tank & Mfg. Co. (64)
Nurnberg Thermometer Co., Inc. (26)
W. M. Welch Manufacturing Company (5-6)

MILLS—See Crushers

MIXERS
Enzinger Union Corp. (64)
Fernholtz Machinery Co. (36-37)
Hardinge Company Inc. (210)
Jack-Stiehl Co. (1-2)
National Engineering Co. (3)
National Tank & Mfg. Co. (64)
Nurnberg Thermometer Co., Inc. (26)

NITRATES AND NITRITES
Braun-Knecht-Heimann-Co. (52)
Monsanto Chemical Company (102-103-104)
Spencer Chemical Company (83)

NITROGEN DERIVATIVES
Braun-Knecht-Heimann-Co. (52)

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For pumping acids, caustics, slurries, viscous liquids, *specify*...

JABSCO
Corrosion Resistant
PUMPS

Patented and Pats. Pend.

SELF PRIMING. Obtains vacuum in excess of 26".

VERSATILE. Handles variety of liquids and slurries at wide range of speeds.

SAFE. Self-priming feature permits cleaner, safer, more accessible installations.

SIMPLE. Easily and quickly disassembled for cleaning.

TROUBLE FREE. Impeller lubricated by liquid pumped. No oil or grease cups. No packing. No metal to metal contact of moving parts. Ball bearings.

MORE CAPACITY for its size and price than any other type of pump. Capacities up to 56 GPM.

FLEXIBLE IMPELLER. Odorless, tasteless, non-toxic corrosion resistant neoprene—also gum rubber if specified.

Stainless Steel Models available in ½", 1", and 1½" port sizes.
Bronze Models available in ¼" up to 1½" port sizes.
Cast Iron Models available in 1", 1¼" port sizes.

JABSCO PUMP COMPANY
2031 LINCOLN STREET • BURBANK, CALIFORNIA

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EXHIBITORS Classified by Products

Shell Chemical Corporation (84–85)
Spencer Chemical Company (83)

NITROHYDROXY COMPOUNDS
Commercial Solvents Corporation (66)

NITROPARAFFINS
Commercial Solvents Corporation (66)

OIL ADDITIVES
American Cyanamid Company (92)
Monsanto Chemical Company (102–103–104)
Oronite Chemical Company (73)
Shell Chemical Corporation (84–85)

OILS
American Cyanamid Company (92)
Braun-Knecht-Heimann Co. (52)

OLEFIN OXIDES
The Dow Chemical Company (53–54–55)

OVENS
Braun-Knecht-Heimann Co. (52)
Central Scientific Company (39–40)
Fernholtz Machinery Co. (36–37)
K. H. Huppert Co. (205)

OXALIC ACID AND OXALATES
American Cyanamid Company (92)
Braun-Knecht-Heimann Co. (52)

PACKAGING EQUIPMENT AND SUPPLIES
Bemis Bro. Bag Co. (74)
International Instrument Co. (41)
Monsanto Chemical Company (102–103–104)

PAINTS
Jack-Stiehl Co. (1–2)
Monsanto Chemical Company (102–103–104)
Nurnberg Thermometer Co., Inc. (26)

PAPER AND PAPER PRODUCTS
Monsanto Chemical Company (102–103–104)

PAPER AND PULP MACHINERY
Fischer & Porter Company (215)
Tracerlab, Inc. (82)

PETROLEUM PRODUCTS
Oronite Chemical Company (73)

pH EQUIPMENT
Braun-Knecht-Heimann Co. (52)
Central Scientific Company (39–40)
Enzinger Union Corp. (64)
National Tank & Mfg. Co. (64)
National Technical Laboratories (24–25)
Nurnberg Thermometer Co., Inc. (26)
W. M. Welch Manufacturing Company (5–6)

PHARMACEUTICALS—See Chemicals, Pharmaceutical

PHENOLS
Braun-Knecht-Heimann Co. (52)
The Dow Chemical Company (53–54–55)
Monsanto Chemical Company (102–103–104)

PHOSPHORUS AND DERIVATIVES
Braun-Knecht-Heimann Co. (52)
A. R. Maas Chemical Co. (71)
Monsanto Chemical Company (102–103–104)

PHTHALATES
American Cyanamid Company (92)
Commercial Solvents Corporation (66)
Monsanto Chemical Company (102–103–104)
Oronite Chemical Company (73)

PIGMENTS
American Cyanamid Company (92)
Los Angeles Chemical Company (81)

PILOT PLANT EQUIPMENT
Duraметallic Corporation (38)
Enzinger Union Corp. (64)
Fernholtz Machinery Co. (36–37)
Fischer & Porter Company (215)
Hardinge Company Inc. (210)
Haveg Corporation (10)
Jack-Stiehl Co. (1–2)
National Tank & Mfg. Co. (64)
Niagara Filter Corporation (14)
Pacific Coast Rubber Company (38)
W. S. Shamban & Co. (217)

PIPE—See Fittings

PLANT LOCATIONS
Fernholtz Machinery Co. (36–37)

PLASTICIZERS
American Cyanamid Company (92)
Carbide and Carbon Chemicals Corporation (27)
Commercial Solvents Corporation (66)
The Dow Chemical Company (53–54–55)
Monsanto Chemical Company (102–103–104)
Oronite Chemical Company (73)
Shell Chemical Corporation (84–85)

PLASTICS
Carbide and Carbon Chemicals Corporation (27)
The Dow Chemical Company (53–54–55)
Haveg Corporation (10)
Monsanto Chemical Company (102–103–104)

PLASTICS, Chemicals and Resins
American Cyanamid Company (92)
Braun-Knecht-Heimann Co. (52)
Carbide and Carbon Chemicals Corporation (27)
The Dow Chemical Company (53–54–55)
Haveg Corporation (10)
Monsanto Chemical Company (102–103–104)
Shell Chemical Corporation (84–85)

PLASTICS PROCESSING EQUIPMENT
Cooper Alloy Foundry Co. (75)
Walter L. Duhig & Co. (75–76)
Haveg Corporation (10)
National Engineering Co. (3)
The Watson-Stillman Co. (76)

PLASTICS, Tubing and Shapes
Haveg Corporation (10)

POLISHING AGENTS
Los Angeles Chemical Company (81)

POLYBUTENES
Oronite Chemical Company (73)

PORCELAIN—See Ceramic and Porcelain Equipment

PREHEATERS—See Heaters

PRESSES
Cooper Alloy Foundry Co. (75)
Walter L. Duhig & Co. (75–76)
Fernholtz Machinery Co. (36–37)
The Watson-Stillman Co. (76)

PROPORTIONING EQUIPMENT
Enzinger Union Corp. (64)
Fischer & Porter Company (215)
International Instrument Co. (41)
Jack-Stiehl Co. (1–2)
National Tank & Mfg. Co. (64)

PUBLICATIONS
Chemical Engineering (78)
Chemical Industries (43)
Food Industries (78)
Maclean-Hunter Publishing Corporation (43)
McGraw-Hill Publishing Co., Inc. (78)

PULVERIZERS—See Crushers

PUMPS
Cooper Alloy Foundry Co. (75)
Walter L. Duhig & Co. (75–76)
Duraметallic Corporation (38)
Enzinger Union Corp. (64)
Fernholtz Machinery Co. (36–37)
Haveg Corporation (10)
Jabsco Pump Co. (35)
Jack-Stiehl Co. (1–2)
National Tank & Mfg. Co. (64)
Nurnberg Thermometer Co., Inc. (26)
Pacific Coast Rubber Company (38)
W. S. Shamban & Co. (217)
Tri-Clover Machine Co. (72)
The Watson-Stillman Co. (76)
W. M. Welch Manufacturing Company (5–6)

PYROMETERS
Braun-Knecht-Heimann Co. (52)
K. H. Huppert Co. (205)
Nurnberg Thermometer Co., Inc. (26)

RADIOISOTOPES
Scientific Service, Inc. (219)
Tracerlab, Inc. (82)

REAGENT CHEMICALS
Braun-Knecht-Heimann Co. (52)
Central Scientific Company (39–40)
Commercial Solvents Corporation (66)
Monsanto Chemical Company (102–103–104)
W. M. Welch Manufacturing Company (5–6)

RECORDING INSTRUMENTS—See Meters

REFRIGERATING EQUIPMENT
Spencer Chemical Company (83)

REGULATORS, Pressure
Enzinger Union Corp. (64)
George R. Friederich & Co. (11–12)
International Instrument Co. (41)
National Tank & Mfg. Co. (64)
Nurnberg Thermometer Co., Inc. (26)

REGULATORS, Temperature
Enzinger Union Corp. (64)
K. H. Huppert Co. (205)
National Tank & Mfg. Co. (64)
Nurnberg Thermometer Co., Inc. (26)

RESEARCH LABORATORIES
Monsanto Chemical Company (102–103–104)
Tracerlab, Inc. (82)

RESINS
American Cyanamid Company (92)
The Dow Chemical Company (53–54–55)
Haveg Corporation (10)
Monsanto Chemical Company (102–103–104)
Shell Chemical Corporation (84–85)

ROTAMETERS
Fischer & Porter Company (215)
Haveg Corporation (10)
Nurnberg Thermometer Co., Inc. (26)

RUBBER ACCELERATORS
American Cyanamid Company (92)
Carbide and Carbon Chemicals Corporation (27)
Commercial Solvents Corporation (66)
Monsanto Chemical Company (102–103–104)

RUBBER CHEMICALS
American Cyanamid Company (92)
Carbide and Carbon Chemicals Corporation (27)
Commercial Solvents Corporation (66)
Los Angeles Chemical Company (81)
Monsanto Chemical Company (102–103–104)
Shell Chemical Corporation (84–85)

RUBBER RECLAIMING CHEMICALS
Braun-Knecht-Heimann Co. (52)
The Dow Chemical Company (53–54–55)

RUBBER SOFTENERS
Commercial Solvents Corporation (66)
Monsanto Chemical Company (102–103–104)

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a TOWER of strength

CUTS PROCESS EQUIPMENT COSTS

Because HAVEG is so strong . . . so light in weight . . . it can cut the cost of huge towers like this. Used in handling corrosive acids, this cooler-absorber tower replaced a battery of smaller ones. Now efficiency of the entire operation is increased, and equipment costs are reduced.

If you need a material with high strength, toughness, durability plus 100% corrosion resistance, investigate HAVEG. This molded material is resistant to chemical action *throughout its entire mass*—not just on the surface. Large, structurally-strong equipment can be molded in one piece, at low cost, and delivered in from 1 to 8 weeks.

HA-5-49

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NEWARK 8, DELAWARE

EXHIBITORS
Classified by Products

RUST PREVENTIVES AND REMOVERS
Monsanto Chemical Company (102-103-104)
Shell Chemical Corporation (84-85)

SAFETY EQUIPMENT
Scientific Service, Inc. (219)
Tracerlab, Inc. (82)

SALT CAKE
American Cyanamid Company (92)
Monsanto Chemical Company (102-103-104)

SCALES, Industrial
Jack-Stiehl Co. (1-2)
W. M. Welch Manufacturing Company (5-6)

SCREENS, VIBRATORS, ETC.
Braun-Knecht-Heimann Co. (52)
Fernholtz Machinery Co. (36-37)
Jack-Stiehl Co. (1-2)
Southwestern Engineering Company (33)

SEBACATES
Commercial Solvents Corporation (66)

SEPARATORS
George R. Friederich & Co. (11-12)
Hardinge Company Inc. (210)
Haveg Corporation (10)

SEQUESTERING AGENTS
Braun-Knecht-Heimann Co. (52)
A. R. Maas Chemical Co. (71)

SILICA GEL
Braun-Knecht-Heimann Co. (52)
Monsanto Chemical Company (102-103-104)

SILICATES, Inorganic
Braun-Knecht-Heimann Co. (52)
Philadelphia Quartz Company of California (4)

SILICATES, Organic
Braun-Knecht-Heimann Co. (52)
Carbide and Carbon Chemicals Corporation (27)

SILICONES
Braun-Knecht-Heimann Co. (52)
The Dow Chemical Company (53-54-55)
Monsanto Chemical Company (102-103-104)

SOAPS AND BASES
Braun-Knecht-Heimann Co. (52)
Oronite Chemical Company (73)

SODA ASH
American Cyanamid Company (92)
Braun-Knecht-Heimann Co. (52)

SOLVENT RECOVERY CHEMICALS
Braun-Knecht-Heimann Co. (52)
Carbide and Carbon Chemicals Corporation (27)

SOLVENT RECOVERY EQUIPMENT
Enzinger Union Corp. (64)
National Tank & Mfg. Co. (64)
Southwestern Engineering Company (33)

SOLVENTS
Braun-Knecht-Heimann Co. (52)
Carbide and Carbon Chemicals Corporation (27)
Commercial Solvents Corporation (66)
The Dow Chemical Company (53-54-55)
Monsanto Chemical Company (102-103-104)
Shell Chemical Corporation (84-85)

SOLVENTS, Aromatic
Braun-Knecht-Heimann Co. (52)
The Dow Chemical Company (53-54-55)
Oronite Chemical Company (73)

STEARATES
Commercial Solvents Corporation (66)

STEEL AND ALLOYS
Cameron Iron Works, Inc. (201)
Jack-Stiehl Co. (1-2)

STILLS—See Distilling Equipment

STYRENES
The Dow Chemical Company (53-54-55)
Monsanto Chemical Company (102-103-104)

SULFONATES
Braun-Knecht-Heimann Co. (52)
Monsanto Chemical Company (102-103-104)
Oronite Chemical Company (73)

SULFONIC ACIDS
The Dow Chemical Company (53-54-55)
Monsanto Chemical Company (102-103-104)
Oronite Chemical Company (73)

SULFUR AND DERIVATIVES
The Dow Chemical Company (53-54-55)
Los Angeles Chemical Company (81)
A. R. Maas Chemical Co. (71)

SURFACE ACTIVE AGENTS
American Cyanamid Company (92)
Braun-Knecht-Heimann Co. (52)
Carbide and Carbon Chemicals Corporation (27)
Commercial Solvents Corporation (66)
Monsanto Chemical Company (102-103-104)
Oronite Chemical Company (73)
Shell Chemical Corporation (84-85)

TANKS
Enzinger Union Corp. (64)
Fernholtz Machinery Co. (36-37)
Haveg Corporation (10)
Jack-Stiehl Co. (1-2)
National Tank & Mfg. Co. (64)
Santa Fe Tank & Tower Company (8)
Southwestern Engineering Company (33)

TANNING—See Chemicals, Leather

THERMOMETERS
Braun-Knecht-Heimann Co. (52)
Enzinger Union Corp. (64)
Kimble Glass, Division of Owens-Illinois Glass Company (62)
National Tank & Mfg. Co. (64)
Nurnberg Thermometer Co., Inc. (26)
Owens-Illinois Glass Company, Kimble Glass Division (62)

TOWERS AND PACKING
Haveg Corporation (10)
Jack-Stiehl Co. (1-2)
Santa Fe Tank & Tower Company (8)
Southwestern Engineering Company (33)

TRAPS, Steam
George R. Friederich & Co. (11-12)

UREA AND DERIVATIVES
Braun-Knecht-Heimann Co. (52)
Monsanto Chemical Company (102-103-104)

VALVES—See Fittings

VARNISH AND BASES
Monsanto Chemical Company (102-103-104)
Shell Chemical Corporation (84-85)

VENTILATING EQUIPMENT
Haveg Corporation (10)
Jack-Stiehl Co. (1-2)

VITAMINS
Braun-Knecht-Heimann Co. (52)
Commercial Solvents Corporation (66)
(Continued on page 358)

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COOPER ALLOY

X-RAY INSPECTION

MEANS SOUND

STAINLESS STEEL

CASTINGS . . .

ONE OF A SERIES...
BEHIND THE SCENES
AT COOPER ALLOY

Day after day, this modern X-ray equipment, plus zyglo, gamma-ray and pressure test facilities, insure the soundness and efficient performance of Cooper Alloy Stainless Steel Valves, Fittings and Castings.

Cooper Alloy Stainless Steel Valves, Fittings and Castings are subjected to the searching eyes of giant X-rays capable of exposing hidden flaws undetectable by ordinary methods of inspection • Each month skilled technicians in this important department process 6,000 large size X-ray plates in order to meet the rigid standards which require 100% X-ray inspection of valve bodies for the entire Cooper Alloy line of Certified Valves—of special castings designed for severe service and of test bars from every single heat in the foundry. Supervising this activity is Norman S. Mott, Chief Chemist and Metallurgist, who is well known for his many technical articles and his popular "Technical Topics," a regular feature of the Cooper Alloy Publication, NEWSCAST

YOURS FOR THE ASKING!

NEWSCAST, an informative technical publication issued by Cooper Alloy for those who Design, Specify or Use Stainless Steel Valves, Fittings or Castings. We shall be pleased to place your name on our mailing list.

THE **COOPER ALLOY** FOUNDRY CO. **HILLSIDE, NEW JERSEY**

THE WORLD'S LARGEST FOUNDRY DEVOTED EXCLUSIVELY TO THE CASTING OF STAINLESS STEEL

SPECIAL EXHIBITS

NATURAL RESOURCES—Many Western states will exhibit mineral samples, maps, photographs on location, photographs of present industrial developments, and most important of all, will have their display manned with individuals most conversant with the natural resources of their state.

ANIMAL CIRCUS—Dorothy Fisher, of Mill Valley, California, will exhibit many laboratory animals with data on their care, breeding and use. The mice will perform in a miniature circus.

NEW CHEMICALS FOR INDUSTRY—is a display of samples of hundreds of new chemicals, together with data on each by Robert L. Taylor, editor of Chemical Industries, in Booth No. 43.

U. S. D. A. LABORATORIES—The United States Department of Agriculture laboratories will display some recent developments in the utilization of farm products.

INDUSTRIAL MOVIES

The movie program runs continuously. These films were selected for their educational and scientific value by a committee of the California Section of the American Chemical Society, headed by Lloyd F. Brooke.

ALASKA—Standard Oil Company of California. Covers the scenic attractions, industries, and people, capturing the pioneering spirit that still prevails in Alaskans; 36 min. color: Tue. 3:11—Fri. 6:52.

ARIZONA—U. S. Bureau of Mines in cooperation with Phelps Dodge Corp. The camera roams over picturesque Arizona finding modern mining and agricultural developments amid the scenic wonders; 40 min. color: Tue. 9:09—Fri. 2:46.

CARBON—BLACK TREASURE—National Carbon Company. Shows the manufacture and testing of carbon and graphite electrodes; 37 min. color: Tue. 8:01—Thu. 5:27.

CLEAN WATERS—U. S. Public Health Service in cooperation with General Electric Company. Makes a case for pollution control through sewage treatment by contrasting views of polluted and unpolluted waters; 20 min. color: Tue. 4:50—Fri. 7:30—Sat. 5:40.

CURVES OF COLOR—General Electric Company. Color spectrum and instrument for recording the color of an object are explained; 11 min. color: Tue. 8:55—Fri. 3:58.

DIE CASTING—New Jersey Zinc Company. Shows the fabrication of intricately shaped, small metal parts from low-melting alloys; 28 min. color: Tue. 5:13—Sat. 3:04.

ENCHANTED ISLES—Standard Oil Company of California. A visit to Tahiti and other isles of the South Pacific, including a voyage to the Marquesas for copra; 33 min. color: Tue. 7:25—Thu. 9:03—Sat. 5:04.

FROZEN FRESHNESS—General Motors Corp. Presents the home freezing of foods; 31 min. color: Tue. 6:21—Thu. 2:35.

THE GIFT OF T'SAI LUN—PAPER—Hammermill Paper Co. History of paper making precedes explanation of present-day paper making operations; 34 min. partly in color: Tue. 5:14—Fri. 7:53.

HAWAII—ALOHA LAND—Standard Oil Company of California. A travelogue showing industry and tourist attractions in the islands; 23 min. color: Wed. 4:04—Fri. 8:30.

JET PROPULSION—General Electric Company. Diagrams explain fundamentals of jet propulsion and construction of jet engines; 15 min. color: Wed. 8:34—Thu. 6:07.

THE LIGHT IN YOUR LIFE—General Electric Company. A young girl learns from a midget professor the workings and many uses of the common electric lamp; 30 min. color: Tue. 2:38—Thu. 7:29.

MAGIC IN THE AIR—General Motors Corp. Shows a television broadcast along with the equipment used for sending and receiving; 11 min.: Tue. 8:41—Sat. 2:50.

MANUFACTURE OF SET-UP PAPER BOXES—High Production Machine Company. A study of manual and machine operations in the fabrication of cardboard boxes; 20 min. color: Wed. 4:59—Fri. 5:56.

MANUFACTURED ABRASIVES—U. S. Bureau of Mines in cooperation with The Carborundum Company. Depicts the manufacture of industrial abrasives, the shaping of grinding wheels, and typical uses; 24 min.: Wed. 5:22—Sat. 2:23.

OIL FOR TOMORROW—Interstate Oil Compact Commission. Shows the techniques of exploration for oil, well drilling, and oil production; 30 min. color: Wed. 7:25—Thu. 3:09.

THE PAINT FILM—New Jersey Zinc Co. A story of the manufacture, function and application of paints; 30 min. color: Wed. 3:08—Fri. 6:19.

PIGS AND PROGRESS—Reynolds Metal Co. The steps in the mining, refining and utilization of aluminum are illustrated; 35 min. color: Tue. 2:00—Fri. 5:18.

REACH FOR A SWEET—Barricini. The manufacture, packaging and displaying of candy; 30 min. color: Wed. 2:00—Fri. 3:25.

SCIENCE IN RESIN DEVELOPMENT—American Cyanamid Co. Depicts the manufacturing processes and technology of various resins; 18 min. color: Wed. 8:52—Fri. 2:25.

SEMPERVIRENS—California Redwood Association. Covers the redwood lumbering industry and the uses of redwood; 32 min. color: Tue. 4:15—Thu. 8:02—Sat. 7:05.

SPRINGTIME IS EGG TIME—Standard Brands. The processing and utilization of egg whites and yolks; 22 min. color: Wed. 5:49—Fri. 2:00.

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Continued

PAPER MILL FELTS can be cleaned or conditioned faster with the aid of AEROSOL Wetting Agents, which speed up the penetration of cleaning solution or water into the felts, assuring more thorough saturation.

WATER SOLUBLE STAINS can be removed in dry cleaning without danger of leaving an undesirable odor when an AEROSOL Wetting Agent in a small quantity of water is used in place of the usual soaps.

Where Speed means Economy or Increased Efficiency use AEROSOL* WETTING AGENTS

Speed is the keynote to economy and profits in many industries today. AEROSOL Wetting Agents meet the increasing demand for speed in a great variety of industrial applications in connection with water, oils and surface coatings—

- . . . to increase spreading action
- . . . to aid penetration
- . . . to improve contact and thus aid adhesion
- . . . to regulate characteristics of precipitates
- . . . to increase the reaction rates between immiscible liquids

AEROSOL Wetting Agents have a great diversity of applications. A few of the fields in which they are being used are illustrated on this page. If you have processes in which thorough and rapid wetting is important, then one of these agents, designed to meet requirements under various industrial conditions, will apply.

Send today for a copy of our comprehensive booklet describing the characteristics and methods of application of the AEROSOL *Wetting Agents.*

*Reg. U.S. Pat. Off.

AN EXCELLENT GLASS CLEANING preparation can be made by dissolving an AEROSOL Wetting Agent in water or in water and a solvent. Such solutions have proved highly effective in cleaning telescopic mirrors prior to aluminizing.

DISPERSION OF PIGMENTS in paints, lacquers, enamels and printing inks can frequently be improved through the use of AEROSOL Wetting Agents, depending on conditions and the results desired.

AMERICAN Cyanamid COMPANY
INDUSTRIAL CHEMICALS DIVISION, DEPT. L-9
30 Rockefeller Plaza, New York 20, N. Y.

STEEL SHAPES FOR INDUSTRY—Lukens Steel Company. Explains the fabrication of steel plate into intricate shapes showing details of cutting, punching, pressing and bending operations; 20 min. color: Wed. 3:41—Sat. 2:00.

THE STORY OF CALIFORNIA AND ITS NATURAL RESOURCES—Richfield Oil Co. Pictures the industries, farming, and resources of the state plus the major cities; 40 min. color: Wed. 6:14—Thu. 4:26—Sat. 8:39.

STORY OF GASOLINE—Bureau of Mines—Standard Oil of Indiana. Animated figures illustrate the formation of petroleum, the processes involved in the manufacture of gasoline, and the methods of evaluating gasoline quality; 23 min. color: Tue. 3:49—Thu. 8:37—Sat. 4:38.

STORY OF AN ORE SAMPLE—American Cyanamid Company. Shows the various processes by which an ore sample can be refined and how the best methods for a particular ore are determined; 26 min. color: Wed. 4:30—Thu. 6:25—Sat. 7:40.

THE STORY OF PALOMAR—California Institute of Technology. Shows the grinding, polishing and installation of the 200-inch telescope atop Palomar Mountain; 41 min. color: Thu. 3:42—Fri. 8:56—Sat. 6:21.

THIS IS OREGON—Standard Oil Company of California. The resources, industry and scenic features of Oregon; 32 min. color: Wed. 2:33—Thu. 6:54.

TINPLATE—Bureau of Mines—Weirton Steel Co. Follows steel from the open hearth furnace to the tin plating operation by both the hot dip and electrolytic methods; 27 min. color: Tue. 6:55—Fri. 4:12—Sat. 8:09.

UTAH—THE RAINBOW LAND—Standard Oil Company of California. Explores a weirdly beautiful land, showing the people who have settled on it; 33 min. color: Wed. 7:58—Fri. 4:42.

WASHINGTON—THE EVERGREEN STATE—Standard Oil Company of California. Shows natural resources, scenic attractions and educational facilities; 32 min. color: Thu. 2:00—Sat. 4:03.

WATER, WATER EVERYWHERE—American Cyanamid Company. Explains the ion exchange method for treating water; 25 min. color: Wed. 6:57—Sat. 3:35.

WHITE MAGIC—Gypsum Association. The story of the mining and refining of gypsum, its fabrication into plaster board and its other manifold industrial uses; 15 min. color: Wed. 9:13—Thu. 5:09—Sat. 6:03.

Compiled from information supplied to Pacific Chemical Exposition.
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EXHIBITORS
Classified by Products

(*Continued from page 354*)

International Instrument Co. (41)

WATER TREATMENT CHEMICALS AND EQUIPMENT

American Cyanamid Company (92)
Braun-Knecht-Heimann Co. (52)
Fischer & Porter Company (215)
Hardinge Company Inc. (210)
Los Angeles Chemical Company (81)
A. R. Maas Chemical Co. (71)
Monsanto Chemical Company (102–103–104)
Niagara Filter Corporation (14)
Philadelphia Quartz Company of California (4)
Scientific Service, Inc. (219)

WAXES

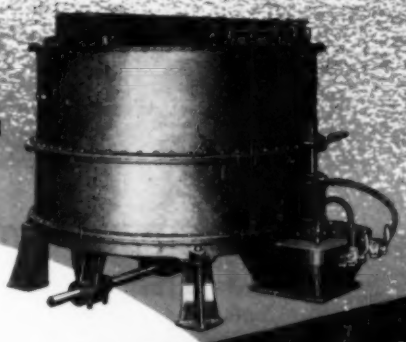
Braun-Knecht-Heimann Co. (52)
Petrolite Corporation, Ltd., Wax Division (45)

WETTING AGENTS

American Cyanamid Company (92)
Antara Products, General Aniline & Film Corp. (68)
Braun-Knecht-Heimann Co. (52)
Carbide and Carbon Chemicals Corporation (27)
Monsanto Chemical Company (102–103–104)
Oronite Chemical Company (73)
Shell Chemical Corporation (84–85)

XANTHATES

Braun Knecht-Heimann Co. (52)
The Dow Chemical Company (53–54–55)



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FOR SANTICIZER 160

New lower prices now are in effect for Santicizer* 141 and Santicizer 160, two Monsanto Plasticizers that improve products made of vinyls. These primary vinyl plasticizers, used separately or in combination, add numerous desirable qualities to films, sheetings, extrusions, protective coatings and floor tile.

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For quotations and technical information on Santicizer 141 and Santicizer 160, contact the nearest Monsanto Sales Office or mail the coupon.

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Excellent processing action
Low-temperature flexibility
Flame resistance
Light stability, resistance to embrittlement
Low volatility
Non-toxicity

Advantages of SANTICIZER 160

Low cost
Excellent processing action
High tensile and tear strength
Low burning rate
Oil and abrasion resistance
Heat and light stability
Gives finest results of any vinyl plasticizer in its price class

Advantages of 141 and 160 blends

Mixtures yield formulations with:
- Economic advantages
- Excellent processing characteristics
- Good light and heat stability
- Excellent outdoor weathering properties
- Good low-temperature flexibility
- Flame resistance
- Good "hand" and drape

CALCIUM NITRATE CRYSTALS IMPROVED...PRICE REDUCED

Monsanto's Merrimac Division, which has manufactured high-grade crystalline calcium nitrate as a latex coagulant for several years, now is offering an improved product to the rubber industry. This white, finer-size, high-purity crystal dissolves faster and has the low water content so desirable for latex coagulation. The new product is packed in 100-pound, waterproof bags and is available in all quantities at the lowest price since before the war. Convenient, ready-to-use solutions of the crystalline product in specially denatured alcohol also are available.

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Industries often need hurry-up service on heavy chemicals and intermediates. Such service is available at Monsanto. Industries always need uniform high quality in these basic chemicals. The Monsanto trademark is assurance of quality. That's why scores of companies are regular customers for Monsanto heavy chemicals and intermediates. Information and quotations on any of these products will be sent promptly upon request. The following heavy chemicals and intermediates are available:

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Basic Chrome Sulfate (Santotan*) for tanning industry • Salt Cake (Sodium Sulfate, Technical) • Sodium Sulfite Anhydrous, Technical (Santosite*) • Sulfur Dioxide • Muriatic Acid • Nitric Acid • Sulfuric Acid

INTERMEDIATES

para-Aminobiphenyl • *para*-Nitrobiphenyl • *ortho*-Anisidine • *para*-Anisidine • Benzoic Acid, Technical • Benzyl Chloride • Dichloroaniline • *ortho*-Chloroaniline • *para*-Chloroaniline • *ortho*-Chlorophenol • *para*-Chlorophenol • Cyclohexylamine • Dicyclohexylamine • Dinitroaniline • Dinitrochlorobenzene, 46.50° • Dinitrochlorobenzene, 48.0° • *ortho*-Nitroaniline • *ortho*-Nitrochlorobenzene • *ortho*-Phenetidin • *para*-Phenetidin • Phenolsulfonic Acid • Sodium Benzoate, Technical • *para*-Toluenesulfonamide • *para*-Toluenesulfonchloride • Toluenesulfonic Acid • Chlorosulfonic Acid • *meta*-Chloroaniline • Monsanto Salt • *ortho*-Aminobiphenyl • *ortho*-Nitrobiphenyl • *para*-Nitrochlorobenzene • *para*-Nitrophenol • Phenol • Phosphorus Oxychloride • Phosphorus Trichloride • Salicylic Acid, Technical

News of Monsanto Chemicals for the Process Industries . . . September, 1949

BIOLITE KEEPS RENTAL LINENS FREE OF MILDEW

With BIOLITE Without BIOLITE

These are the advantages of Biolite (a solution of sodium pentachlorophenate): Can be applied in any standard commercial laundry equipment . . . no additional handling or washing operation required . . . eliminates the problem of mildew forming between pick-ups . . . costs only a few cents per hundred pounds of wash . . . no discoloration of fabrics . . . works on all types of fabrics. For more information, ask for folder entitled: "Cut Mildew Loss With Monsanto Biolite."

NEW LITERATURE tells how Santochlor* (Monsanto's *para*-Dichlorobenzene) is used to stop moth attack in clothing, furs, rugs, upholstery. It's profitable reading. For your copy, use the coupon. Ask for: "Santochlor (*para*-Dichlorobenzene) For Clothes Moth Control."

PAS AVAILABLE

Monsanto *para*-Aminosalicylic Acid is available in commercial quantities for continuing experimental work in tuberculosis therapy. Samples will be sent to pharmaceutical manufacturers without cost or obligation.

Monsanto's Sodium Tripolyphosphate has amazing efficiency as a builder or detergent aid in any type of cleaning compounds including those for dairies, metal cleaning and textile processors.

Sodium Tripolyphosphate gives detergency a boost through synergistic action . . . helps in peptizing and emulsifying soil . . . prevents formation of calcium and magnesium deposits caused by hard water and acts as a solvent for such deposits made previously . . . controls alkalinity through buffering action.

Put *extra* qualities into your cleaning compounds with Monsanto Sodium Tripolyphosphate and see how its extra performance brings you extra sales. Further information and quotations will be sent on request. Ask for the new Technical Bulletin No. P-139 which gives full details on Monsanto Sodium Tripolyphosphate.

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TETRA POTASSIUM PYROPHOSPHATE
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Di Calcium Phosphate
Calcium Pyrophosphate
Tri Calcium Phosphate
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Mono Potassium Phosphate
Di Potassium Phosphate
Tri Potassium Phosphate
Magnesium Phosphates
Aluminum Phosphates
Iron Phosphates
Alkyl Acid Phosphates
Alkyl Alkali Phosphates
Special Phosphates

Address inquiries to:
MONSANTO CHEMICAL COMPANY, Desk J, 1702 South Second Street, St. Louis 4, Missouri, or contact Monsanto Sales Offices in Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.

*Reg. U.S. Pat. Off.

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You can profit from the synergistic action of Santomerse* No. 1 and Monsanto Tetra Sodium Pyrophosphate by making more effective cleaning compounds at economical costs. Your better products result in satisfied customers and repeat business. Economical production may enable you to meet competitive prices or enjoy a wider profit margin.

Synergistic Action is the result of the two Monsanto detergents working together to give cleaning power greater than the average of the two used separately . . . greater than either used alone. Tetra sodium pyrophosphate, priced even lower than economical Santomerse No 1, lets you reduce costs while making a more powerful cleaning compound.

When building entirely new products or improving your present line, look into the opportunities offered by the synergistic action of Santomerse No. 1 and Monsanto TSPP. For details, mail the coupon, contact the nearest Monsanto Sales Office or write Monsanto headquarters in St. Louis.

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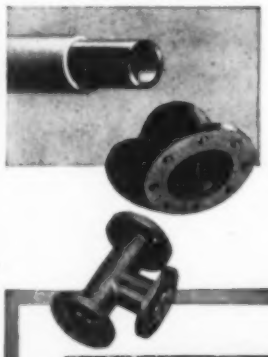
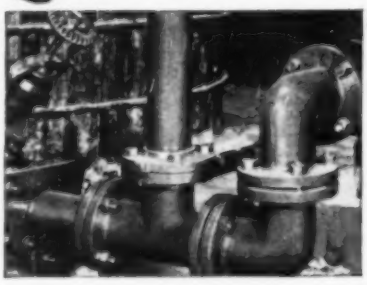
saran lined steel pipe





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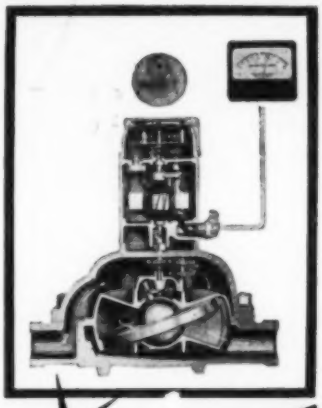

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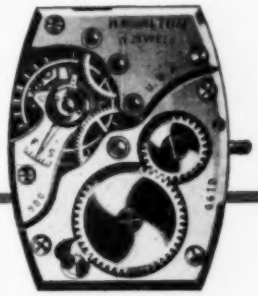
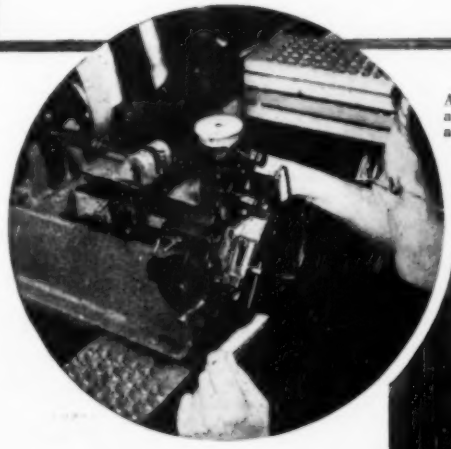
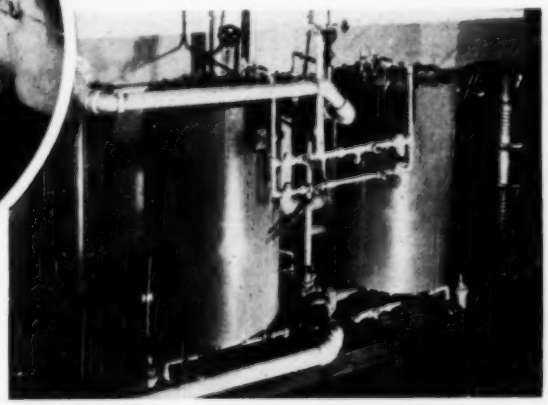




A jet of moisture-free air blows the chips away after each cut.



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If you're having trouble with moisture in your air lines, or with high humidity in rooms where you're working with or storing machined metal parts, we'll help you eliminate it. Write Pittsburgh Lectrodryer Corporation, 303 32nd Street, Pittsburgh 30, Pennsylvania.

In England: Birlec, Limited, Tyburn Road, Erdington, Birmingham.
In Australia: Birlec, Limited, 51 Parramatta Road, Glebe, Sidney.

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USE-FILE #28-1

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SILICATE P's & Q's

For more information on these silicate uses write for the above file numbers.

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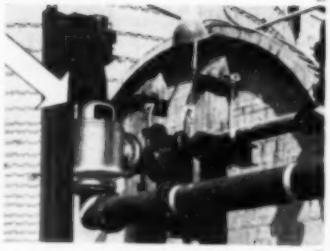

Nettco Flomix* at Shell Development Co., Deerpark, Texas, mixing fluids in pipe line.

*Patented

NEW ENGLAND TANK & TOWER CO.
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In collaboration with engineers and research men of the B. F. Goodrich Company

461 pages, 445 illustrations, $6.50

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This guide shows you how to reduce vibrations with rubber mountings—how to determine when extruded rubber parts can be used—how to use packing and sheet rubber, etc. Its tremendous store of useful information is ready to help you find the right answers, the first time, to your specialized design and construction problems.

Stage-by-stage procedures show you how:

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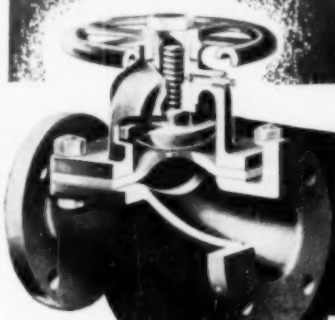

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HILLS-McCANNA

diaphragm valves

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Proportioning Pumps

Force-Feed Lubricators • Magnesium Alloy Castings

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USE-FILE #29-4

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USE-FILE #27-18

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SILICATE P's & Q's

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ODORS: PHYSIOLOGY AND CONTROL summarizes all advanced knowledge of odors and offers a unique theory of odor stimulation. It provides extensive information on a variety of measures for the elimination of odors in food, in industry, in the home, and on the person. You're shown the methods being used to combat and eliminate odors, together with many other theories and little known facts about them.

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By Carey P. McCord,
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and Wm. N. Witheridge,
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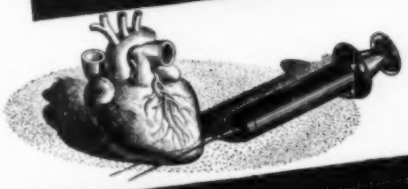

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Technical GLYCERINE NEWS

AN EFFECTIVE METHOD OF TREATING PERITONITIS by glycerine application is described in a recent medical paper. Drs. E. D. and R. W. Smith report in *The Southern Surgeon* that glycerine induces drainage from infected tissues and exerts antiseptic and bactericidal action on the bacteria of peritonitis. At the same time, it permits normal functioning of the body cells to promote healing. (D-17)

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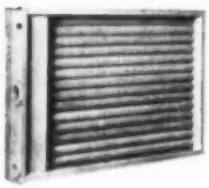

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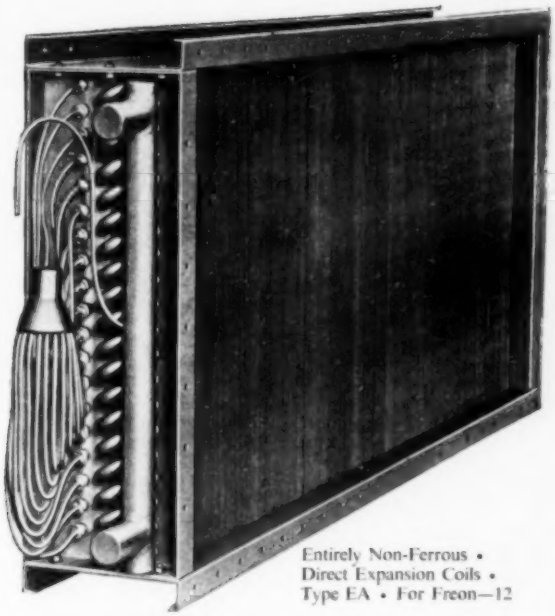

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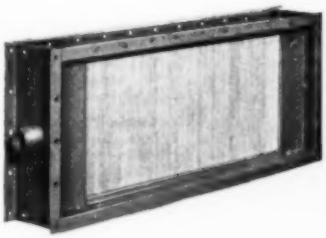

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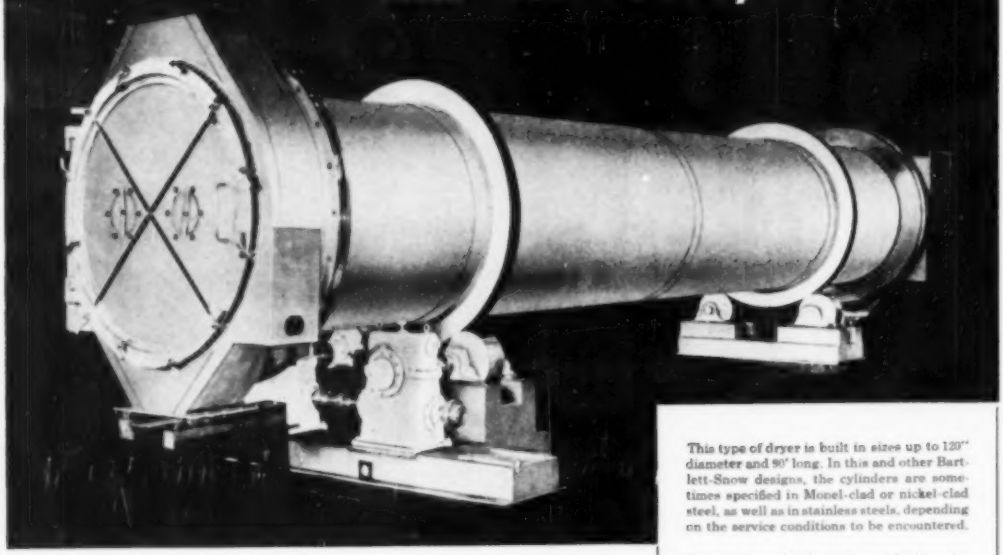

This type of dryer is built in sizes up to 120" diameter and 90' long. In this and other Bartlett-Snow designs, the cylinders are sometimes specified in Monel-clad or nickel-clad steel, as well as in stainless steels, depending on the service conditions to be encountered.

Following are the detailed specifications for the pictured unit:

Cylinder – Type 347 (columbium stabilized, 18% Cr – 9.50% Ni) solid plates ¼" thick, # 4 finish on inside, pickled and annealed on the outside.

Reinforcing Bands on Cylinder – Type 304 (19% Cr – 9% Ni) 20% clad, with carbon steel side against the cylinder. Pickled and annealed finish on the stainless (exterior) side.

Conveyor Flights – Type 347 solid stainless – 12 gauge sheet, # 4 finish both sides.

Trunion and Drive Bases – Type 304 – 20% clad ⅜" steel plate. Supporting pads are of Type 303 ("free-machining 18-9") stainless steel bars, machined.

Breechings – Type 347, ¼" solid stainless plate, # 4 finish on one side, annealed and pickled on the other.

Breeching Supports – Box sections, Type 304, 20% clad, 3 16" thick, annealed and pickled finish.

Guards – Type 304 solid 18-gauge stainless steel, pickled and annealed.

Door Castings – Alloy Casting Institute Grade "CF-8C" (similar to Type 347 rolled material) castings ground and polished.

Seal Castings – Outer stationary ring and rotating flange ring cast in "CF-8C". Inner floating ring, 19% Cr – 9% Ni casting, ("CF-20").

All parts not polished are sand blasted.

HERE'S another outstanding application of austenitic chromium-nickel stainless steels . . .

A direct heat rotary dryer . . . 32 feet long, five feet in diameter . . . fabricated entirely of stainless to prevent product contamination, to defeat corrosion, and to combat wear. In addition, the chromium-nickel stainless steel parts are easy to clean and keep clean.

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Specify stainless steels wherever you want long, trouble-free performance. Leading steel companies produce austenitic chromium-nickel stainless steels in all commercial forms. A list of sources of supply will be furnished on request.

Over the years, International Nickel has accumulated a fund of useful information on the properties, treatment, fabrication and performance of engineering alloy steels, stainless steels, cast irons, brasses, bronzes, nickel silver, cupro-nickel and other alloys containing nickel. This information is yours for the asking. Write for "List A" of available publications.

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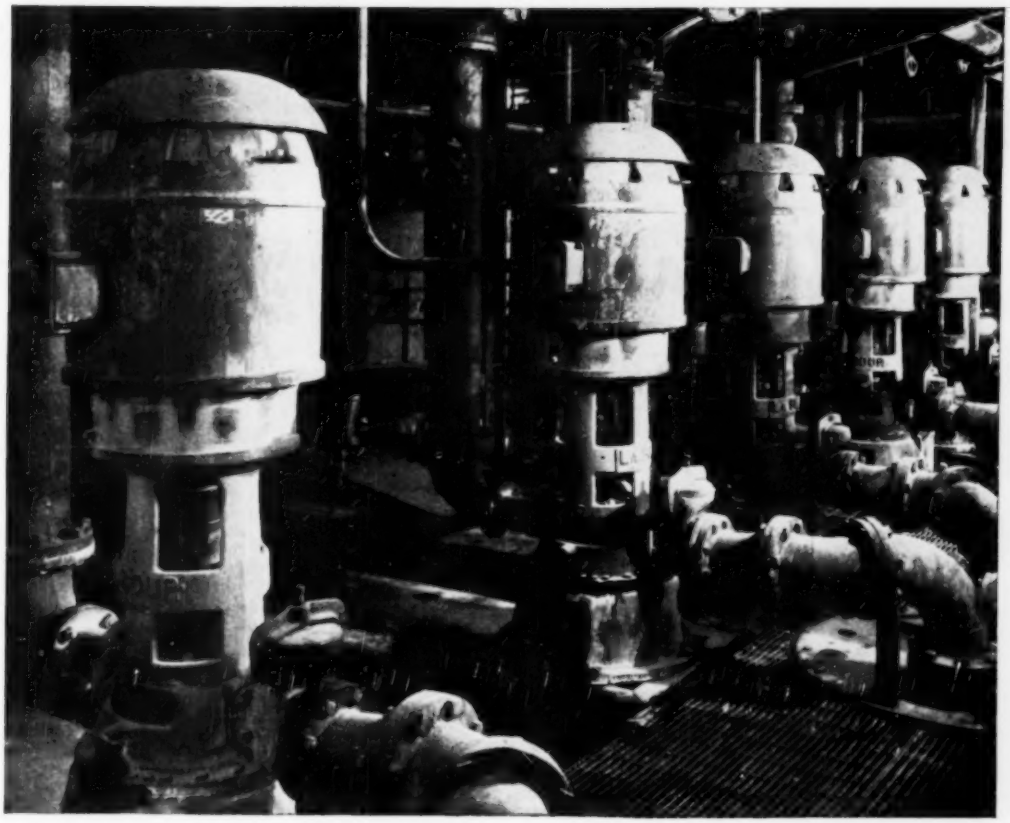

. . . and they specify LABOUR

Here are five LaBour Type G packingless self-priming pumps at work in the sulphuric acid contact system at Mathieson Chemical Corporation's Baltimore plant. The engineers who designed this installation were told to use LaBour pumps because the customer's previous experience dictated this selection.

Dependable continuity of operation is a vital factor in contact service. That's why the known reliability of LaBour pumps was the very first consideration. Second, Type G eliminates all difficulties arising from packing glands or mechanical seals because this pump has neither.

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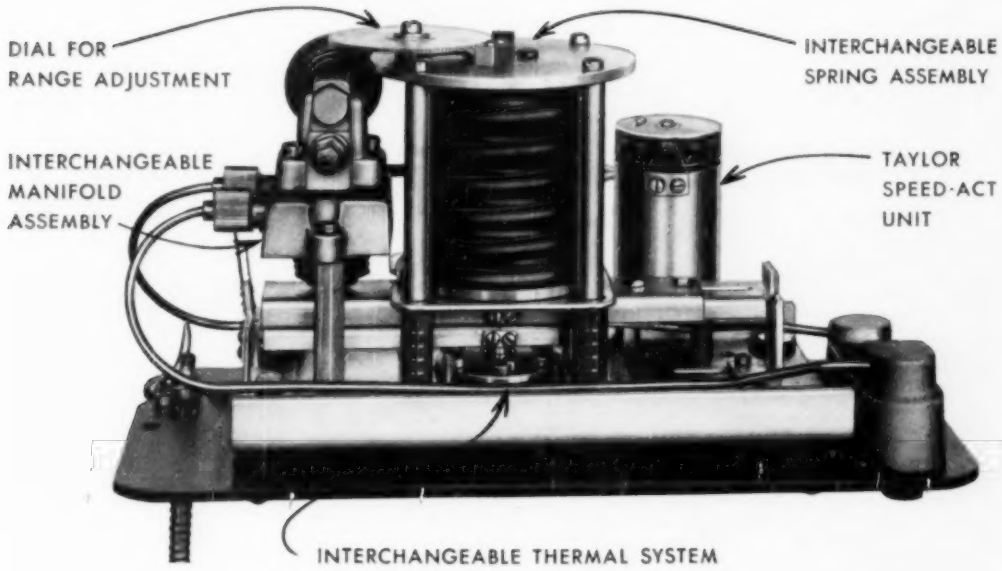

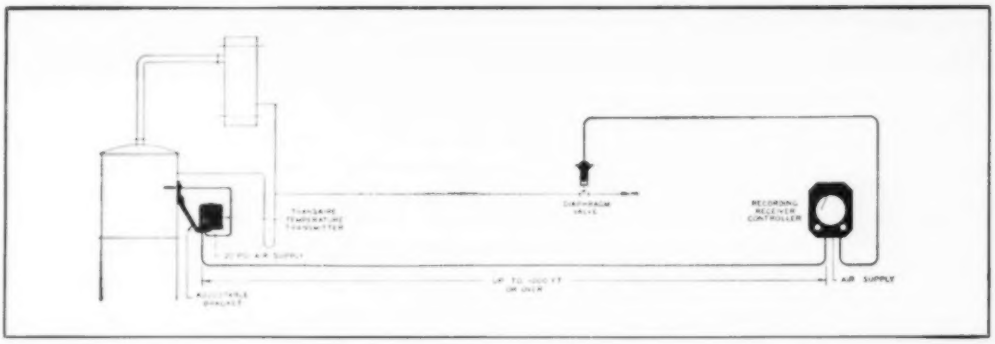

QUICK PICTURE OF DYNAMIC ACCURACY

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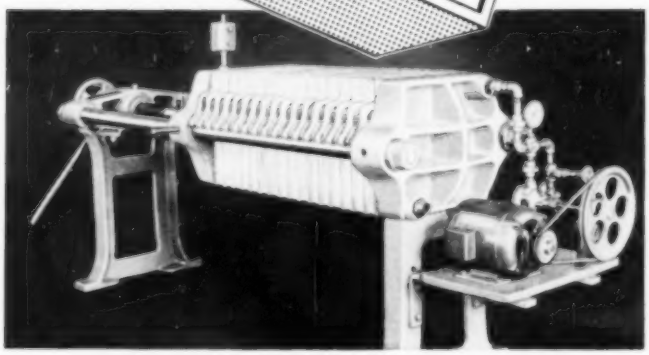

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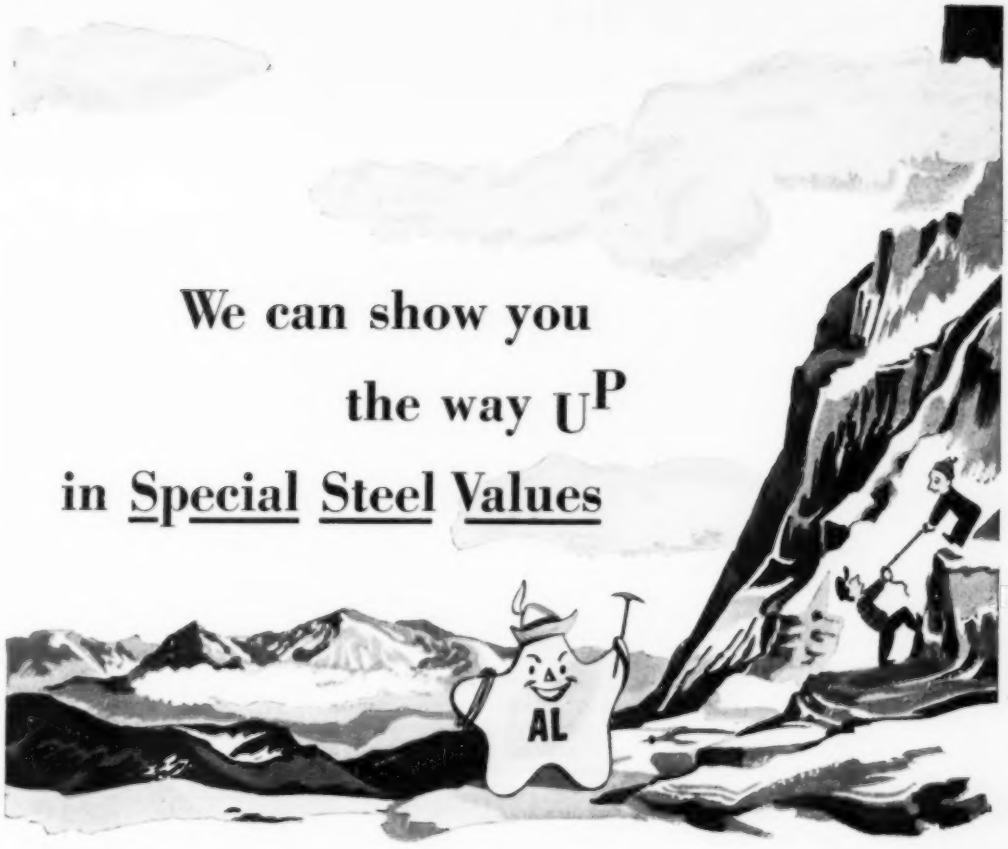

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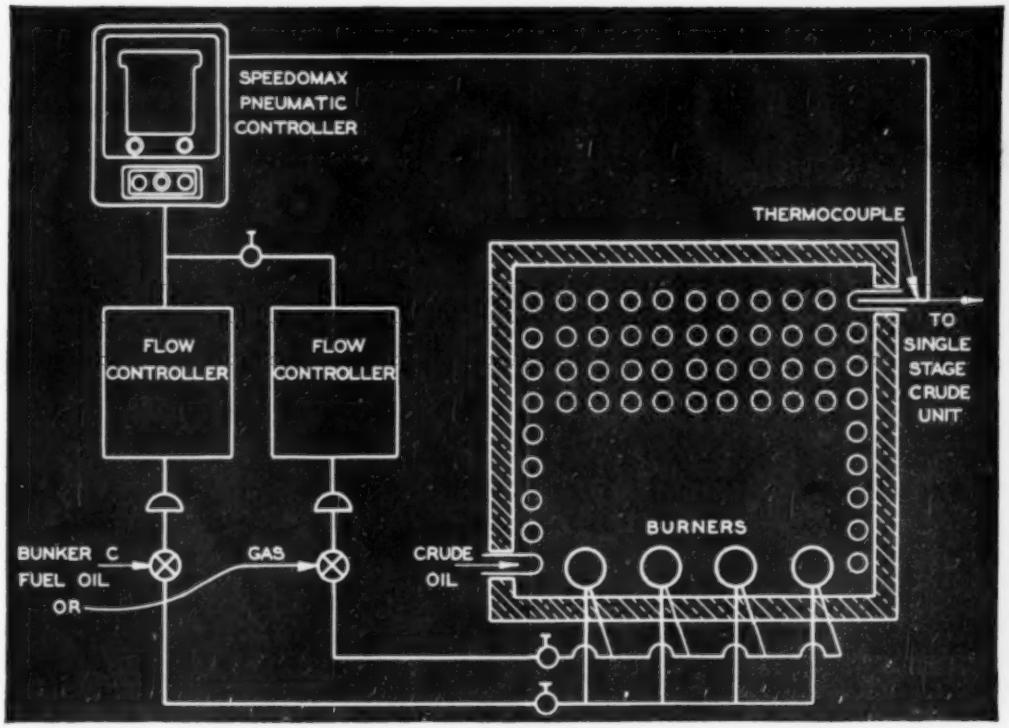

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MEASURING SATISFACTORY PERFORMANCE

. . . IN EVERY TEST!

QUAKER PACKINGS ARE "PRE-TESTED" TO ASSURE PERFECT FIT, MAXIMUM EFFICIENCY THROUGHOUT THE CHEMICAL INDUSTRY

A packing that doesn't fit accurately on a pump can mean loss of material . . . loss of maintenance time. That's why Quaker Packings are pre-tested as many as 18 times to assure satisfactory performance in every installation wherever they are used throughout the Chemical Industry.

Measuring for accurate size is just one of the many tests Quaker Packings go through before leaving the plant. Each and every test is designed to safeguard the performance of these packings when they are put into use. Pre-tests that assure long, trouble-free operation, freedom from unnecessary breakdowns and loss of materials.

For packing that stands up under extreme temperatures, that's unaffected by hot acids, asphalt or oils, that's impervious to alcohols, acetates or corrosive gases . . . look to Quaker. There's a Quaker Packing to fit the most difficult and demanding needs of the Chemical Industry.

HOSE THAT LASTS

. . . because it has been pre-tested to stand pressure and resist wear. Quaker Hose is available for use with air, water, steam, volatiles, acids and gases.

FOR PEAK HORSEPOWER

Quaker belts are pre-tested for every industrial need . . . belts of all kinds, that assure peak efficiency under all operating conditions.

QUAKER RUBBER CORPORATION

PHILADELPHIA 24, PA. • New York 7 • Cleveland 15 • Chicago 16 • Houston 1
Western Territory
QUAKER PACIFIC RUBBER CO. • San Francisco 10 • Los Angeles 21 • Seattle 4

QUAKER

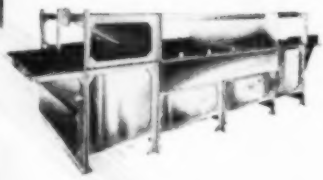
RUBBER PRODUCTS

REG. U. S. PAT. OFF.

TAMES A
POWER THROB
FLEXINEERING ELIMINATES VIBRATION ON TUG DIESEL EXHAUST
. . . PROVIDES SMOOTHER POWER . . . COOLER OPERATION
When the giant 16 cylinder, 1750 horsepower diesel engine of the new tugboat, Grace Moran, roars into action, there's a smooth purr of silky power. And one of the keys to this vibration-free operation is "flexineering"—the scientific engineering of flexible metallic tubing to industry's specific needs.
From the exhaust to the stack is a five foot length of Penflex air jacketed 14 inch, interlocked, flexible metallic tubing which achieves a circulation of air and an efficient cooling action. Tough, rugged tubing that keeps exhausts as tight as a pipe . . . yet provides all of the flexibility necessary to "soak up" the constant vibration.
Whether your problem is vibration in exhaust or air lines . . . the transmission of liquids, volatiles, granular material or coarse abrasive products . . . or even the protection of fine lead wires on instruments, "flexineering" has the answer for you. Penflex engineers will be glad to work with you in the application of tubing from ⅛ inch I. D. on up to 24 inch I. D. . . . Write today for your copy of "Flexineering."
PENNSYLVANIA FLEXIBLE METALLIC TUBING CO.
7234 Powers Lane
Philadelphia 42, Penna.
Branch Sales Offices
BOSTON • NEW YORK • CLEVELAND
CHICAGO • HOUSTON • LOS ANGELES
Penflex... HEART OF INDUSTRY'S LIFE LINES

Copyright 1949—Penna. Flexible Metallic Tubing Co.

WE BRING YOUR DRAWINGS TO LIFE!



SHEET METAL FABRICATION
Made to Meet EXACT Specifications

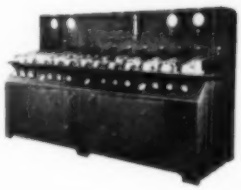
For over 41 years, fabrication of sheet metals has been an important part of the Kirk & Blum business. Throughout all these years, we have been guided by one fixed ideal: To interpret the customer's blue prints accurately, and produce finished work that exactly meets specifications.

We specialize in parts and assemblies of sheet steel ($\frac{3}{8}$" plate or lighter), stainless (all types), monel and other alloy sheet or plate. We are equipped for "custom built" or quantity production of sheet metal products: pickling baskets, crates, lead and rubber-lined tanks, machine bases, pans and guards; electrical enclosures, such as, panel boards, control boards, control desks, cubicles, etc.

Modern expanded facilities, plus highly skilled workmen trained in the use of specially built equipment, enable us to produce accurately-made sheet metal parts faster and more economically. We are completely equipped for cutting shearing, forming, bending, rolling, welding, and assembling completed products and sub-assemblies.

Send us your prints for prompt quotation.

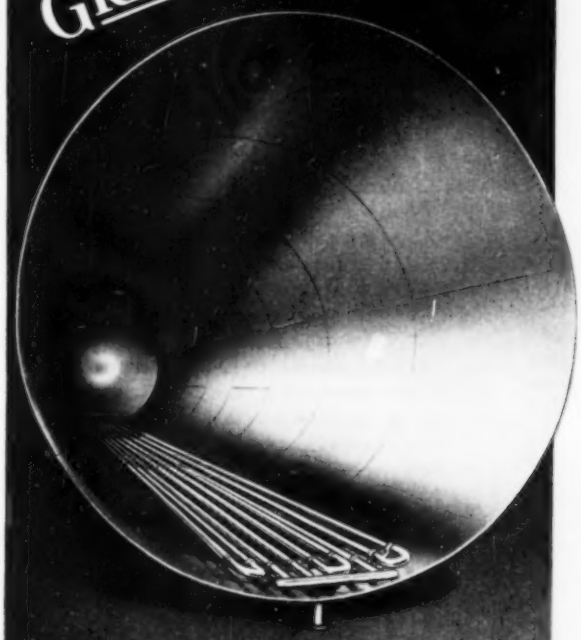
WRITE FOR BOOKLET: "SHEET METAL ASSEMBLIES"



KIRK AND BLUM

THE KIRK & BLUM MFG. COMPANY, 2908 SPRING GROVE AVENUE, CINCINNATI 25, OHIO

STAINLESS FABRICATION GRAVER



VESSELS LINED IN STAINLESS OR ALLOYS

Graver is especially well equipped to line vessels for the chemical industry—in the shop or in the field—using stainless steel, alloys, or Hastelloy.

SAY ALL THREE IN THE SAME BREATH

■ When you think of stainless steel fabrication, think of GRAVER! A special division is devoted exclusively to engineering and fabrication of vessels and structures to meet the exacting standards of the process industries. Complete facilities are maintained for fabrication of stainless, stainless clad, nickel, nickel clad, Monel, Everdur and aluminum. Vessels of any size, 12 gauge and heavier can be supplied with finishes up to and including No. 4.

Graver's shops are equipped for all phases of the manufacturing process . . . shearing, forming, welding, annealing and quenching, machining, polishing, x-raying, and testing. Complete compliance with code requirements is assured.

Take advantage of a specially equipped, specially manned organization that's set up to do your work. Write now for full information and quotations.

GRAVER

STAINLESS AND ALLOY STEELS DIVISION

GRAVER TANK & MFG. CO., INC.

EAST CHICAGO, INDIANA

NEW YORK • PHILADELPHIA • CHICAGO • CATASAUQUA, PA. • HOUSTON • SAND SPRINGS, OKLA.

HOW *Flexible* IS FLEXIBLE?

We claim "flexibility" to be an important feature of the Republic Pneumatic Transmitter. Its importance to you, however, depends largely upon what we mean by "flexible."

To be easily adaptable to a wide variety of metering applications under varying conditions is our interpretation of "flexibility." The Republic Pneumatic Transmitter is an extremely accurate metering device which, through the simple interchange of a few standard parts, can be adapted to the measurement of flow, pressure, level or density of a wide variety of fluids.

Furthermore, it has been so designed that by making a few minor adjustments or substituting a few small parts, it's operation can be easily changed to any desired range between a minimum of 0 -0.6" of water to a maximum of 0 -704" of water. Range supression (up to 80%), reversal or compounding (plus and minus scales) can be accomplished in the same simple manner. All of these changes can be easily made in the field.

We repeat—"flexibility" is an important feature of the Republic Pneumatic Transmitter.

★ ★ ★

The Republic Transmitter is a pneumatic metering device. It employs the force-balance principle to convert process variables such as flow, liquid level, pressure or liquid density, into air pressures which vary proportionally with the process variables.

These air pressures become direct measurements and can be conducted to reading instruments or used as the measuring impulse for the actuation of an automatic controller.

For complete details write for Data Book No. 1001

REPUBLIC FLOW METERS CO.
2240 Diversey Parkway, Chicago 47, Illinois

ANNOUNCING 6" DIAMETER PYREX BRAND GLASS PIPE!

TO its regular line of 1", 1½", 2", 3" and 4" PYREX brand Glass Pipe, Corning adds a new 6" diameter. It is available in standard lengths of ten feet. Six inch fittings include elbows, tees, crosses and reducers.

Balanced stocks of PYREX brand glass pipe and fittings in all sizes are maintained and shipments can be made to any point quickly after orders are received.

CORROSION CONTROL AT LOWEST COST

A recent survey taken among users of PYREX brand Glass Pipe shows that it is considered the lowest cost piping material with which to control corrosion. There are over twenty years of satisfactory experience *behind* the product.

MAKE THIS SIMPLE TEST

If you haven't had any experience in using PYREX Pipe in your process lines, make a modest test installation! It can be assembled to any other piping or process equipment by means of adaptor flanges. This simple test will show how practical PYREX Pipe is, not only in combating corrosion but also in giving you longer service plus visibility and easy cleanability.

NEW INSTALLATION BULLETIN!

SEE HOW OTHERS ARE using PYREX brand Glass Pipe in their operations. Write for the new Corning booklet, "PYREX brand Glass Pipe in the Process Industries." Use convenient form below.

CORNING GLASS

PLANT EQUIPMENT SALES DEPARTMENT

CORNING GLASS WORKS, CORNING, N. Y.

TECHNICAL PRODUCTS DIVISION: GLASS PIPE • SIGNALWARE • LABORATORY GLASSWARE • GAUGE GLASSES • LIGHTINGWARE • OPTICAL GLASS • GLASS COMPONENTS

CORNING GLASS WORKS, Dept. CE9, Corning, N. Y.

☐ We are interested in 6" PYREX brand Glass Pipe. Send full particulars.

☐ Send copy of booklet, "PYREX Pipe in Process Industries."

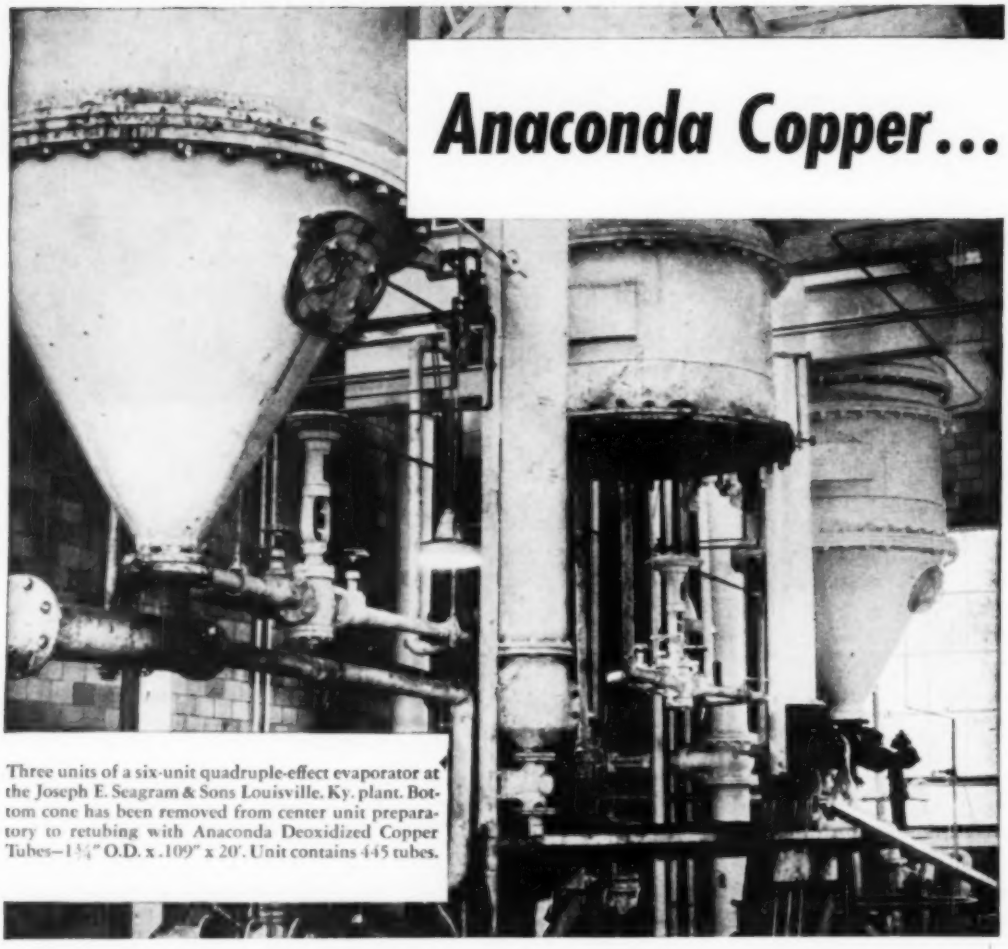
NAME_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

Anaconda Copper...



Three units of a six-unit quadruple-effect evaporator at the Joseph E. Seagram & Sons Louisville, Ky. plant. Bottom cone has been removed from center unit preparatory to retubing with Anaconda Deoxidized Copper Tubes—1¾" O.D. x .109" x 20'. Unit contains 445 tubes.

Copper Tubes Go Into 6-Unit Evaporator in Seagram's Plant, Louisville, Ky.

Inserting the copper tubes into the 1¾" thick copper tube sheet.

Manually expanding copper tubes into tube sheet at bottom of still-age evaporator.

These modern evaporating units are being retubed with Anaconda Deoxidized Copper to obtain the most in heat transfer efficiency, non-contamination of product *and* long-range economy.

This evaporator receives its feed from dewatering screens and presses at 130° F. The feed is approximately 4% solids—in suspension and dissolved. The liquid is fed at 9,000 gallons per hour to the 4th effect evaporator and continuously fed to the other effects in a backward feed. Final concentrations take place in forced circulation evaporators. 3.34 lb. of water are evaporated per pound of steam. Total evaporation: about 70,000 lb. per hour.

Old Hand at solving New Problems

For well over a century, copper from The American Brass Company has been solving problems in the manufacture of stills, vats, storage tanks, heat exchangers, pipe lines—and a host of other types of chemical and processing equipment.

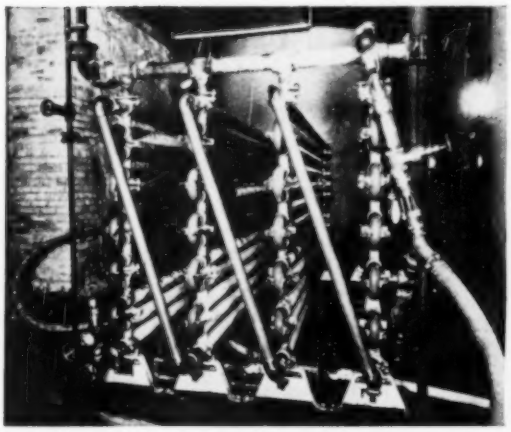
To provide the most efficient service in each application, Anaconda furnishes several types of copper having distinctive chemical and physical properties. These include Electrolytic (Tough Pitch) Copper, Deoxidized Copper, and several others.

In specifying Anaconda Copper, consider the relative importance of: weldability, workability, electrical and thermal conductivity, operating temperature range and corrosion resistance. Then consider the type of Anaconda Copper to serve best in your application.

Whatever your problem, if it involves copper or any copper alloy in wrought form, remember that the facilities of our Technical Department are maintained for *your* benefit. Users, designers and fabricators of processing equipment are invited to ask for this service.

Badger Builds with Copper

The Badger Manufacturing Company, Cambridge, Mass., fabricated this 20-foot-high aldehyde exhausting column from Anaconda Deoxidized Copper, .109" gage. Bubble caps are made from the same material. Diameters of the column are 72" and 102". One of the 72" sections, showing the bubble caps, is shown below.



Enzinger Union Lines Steel Tubes with Copper

This highly efficient double pipe cellar beer cooler uses Anaconda Copper Tubes. For brine service, the inner tubes are of seamless hard drawn copper; for ammonia service, the tubes are of seamless steel with a seamless copper lining spun or drawn into place, so as to make a closely bonded joint between steel and copper. Return bends are of bronze. Beer comes in contact only with the bronze and copper, while the ammonia coolant contacts only steel. Copper and bronze were chosen for high heat transfer and ease in working. The double pipe cooler is made by Enzinger Union Corporation, Angola, New York.

ANACONDA

Anaconda

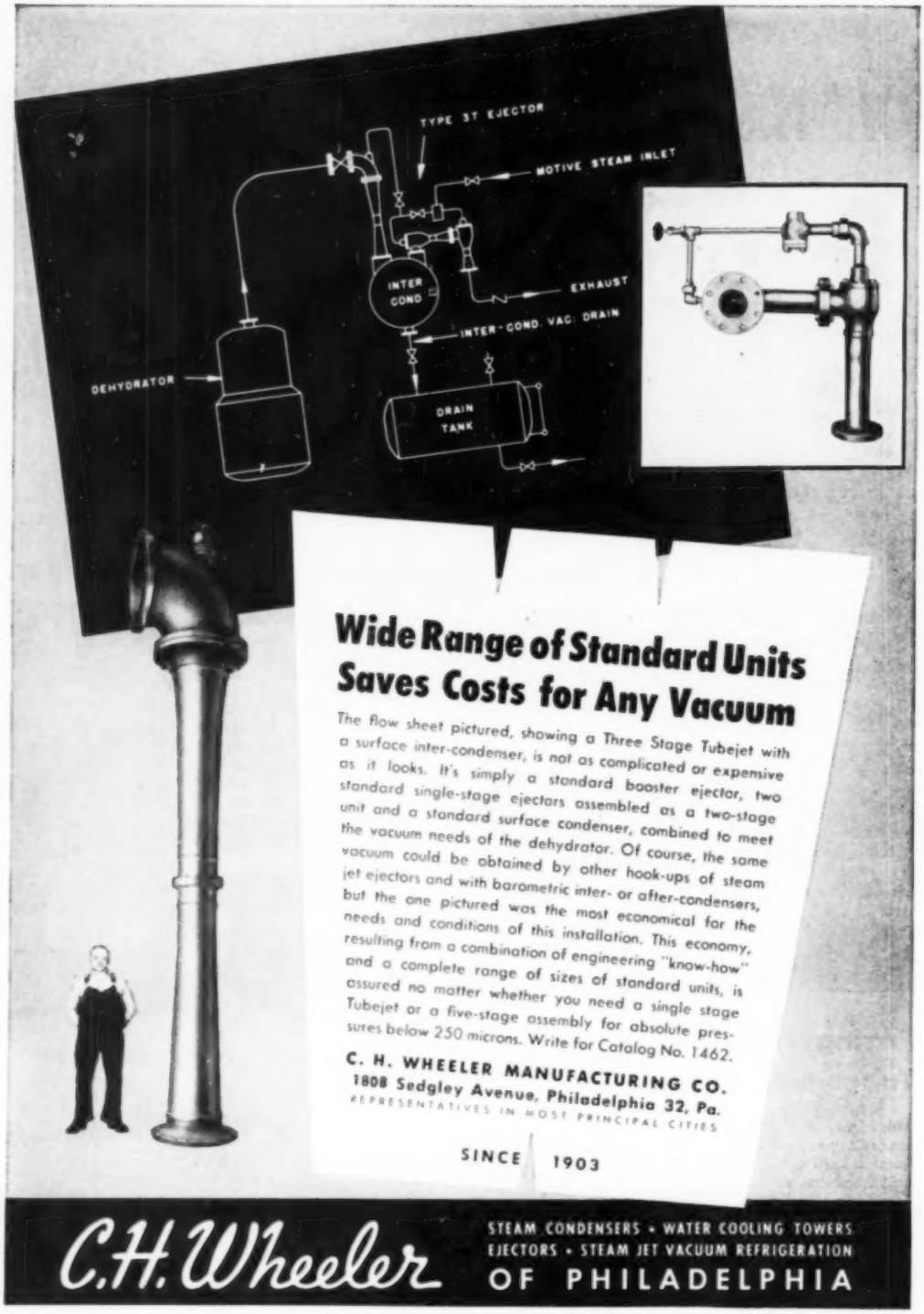
COPPER & COPPER ALLOYS

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut

Subsidiary of Anaconda Copper Mining Company

In Canada: Anaconda American Brass Ltd., New Toronto, Ont.



Wide Range of Standard Units Saves Costs for Any Vacuum

The flow sheet pictured, showing a Three Stage Tubejet with a surface inter-condenser, is not as complicated or expensive as it looks. It's simply a standard booster ejector, two standard single-stage ejectors assembled as a two-stage unit and a standard surface condenser, combined to meet the vacuum needs of the dehydrator. Of course, the same vacuum could be obtained by other hook-ups of steam jet ejectors and with barometric inter- or after-condensers, but the one pictured was the most economical for the needs and conditions of this installation. This economy, resulting from a combination of engineering "know-how" and a complete range of sizes of standard units, is assured no matter whether you need a single stage Tubejet or a five-stage assembly for absolute pressures below 250 microns. Write for Catalog No. 1462.

C. H. WHEELER MANUFACTURING CO.
1808 Sedgley Avenue, Philadelphia 32, Pa.
REPRESENTATIVES IN MOST PRINCIPAL CITIES

SINCE 1903

C.H. Wheeler

STEAM CONDENSERS • WATER COOLING TOWERS
EJECTORS • STEAM JET VACUUM REFRIGERATION
OF PHILADELPHIA

Love, of course, is as old as old can be. The *young* idea we call your attention to is that sleek material their rainwear is made of, vinyl plastic. Modern chemists developed it just ten years ago.

Thousands of things are now made of vinyl plastic, one of the most versatile new materials man has created. You find it in upholstery, floor covering, recordings, piping, shoe soles, shower curtains, textiles, wall tile—all of them notable for durability, washability and beauty. All stainproof, rotproof, nonflammable, water repellent.

Tons of DIAMOND ALKALI Chlorine are used by the producers of vinyl plastic. Other DIAMOND chemicals add special qualities: Chlorowax 40, for moldability; Chlorowax 70, a fire retardant; Precipitated Calcium Carbonate, a filler; Chromate, a pigment. The growth of plastics is rooting these *Chemicals You Live By*, especially chlorine, deep in your daily life.

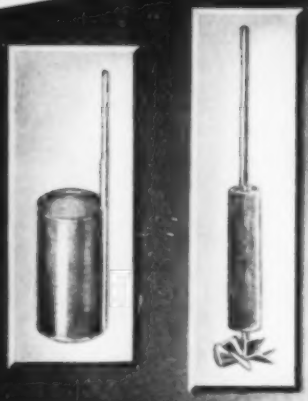
THIS ADVERTISEMENT is one of a series appearing in Time and Newsweek to broaden public understanding of the part DIAMOND ALKALI chemicals play in everyday life. We welcome your inquiry regarding chlorine and other chemicals produced for the plastics industry.

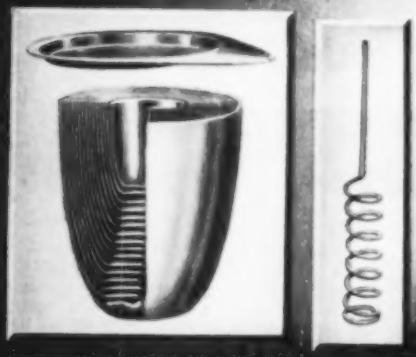
DIAMOND ALKALI CHEMICALS

Chemicals you live by DIAMOND ALKALI COMPANY... CLEVELAND 14, OHIO

SODA ASH • CAUSTIC SODA • CHLORINE & DERIVATIVES • BICARBONATE OF SODA • SILICATES • CALCIUM COMPOUNDS • CHROME COMPOUNDS • ALKALI SPECIALTIES

BAKER PLATINUM LABORATORY WARE



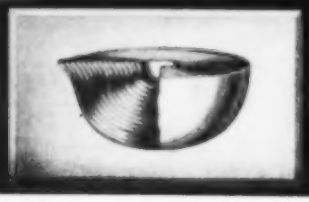


Baker platinum laboratory ware is made under the direct supervision of scientific men who use it daily in our own laboratories.

No better controlled manufacturing conditions could be devised for the production of apparatus with the metallurgical and mechanical precision required for scientific use.

The natural result is that Baker laboratory ware is continuously under test and as improvements have suggested themselves, they have been made. Instances are the introduction of platinum-rhodium for this ware, our reinforced rim crucibles and dishes, the Baker Low Form crucible and the reinforcement of the junction of stem and cylinder in stationary type electrodes.

Our *Data Concerning Platinum* contains a catalogue of Baker laboratory ware as well as useful tables and other valuable information. Send for a copy.



BAKER & CO., INC.
113 Astor St., Newark 5, N. J.
New York 7 Chicago 2
San Francisco 2

Keeping the Navy "*Ship Shape*" with the Dempster-Dumpster . .

Shipyards, stations, and the men in Uncle Sam's Navy set a standard of cleanliness that is unsurpassed. Helping to maintain this high standard of Navy cleanliness is the Dempster-Dumpster System of materials handling . . . a system of quick pick-up of preloaded containers for hauling, dumping or moving materials.

Exactly 10 years ago the Navy purchased its first Dempster-Dumpster equipment . . . one truck hoisting unit with several containers. Now there are dozens of hoisting units and thousands of Dempster-Dumpster containers of many types at work keeping Navy yards and stations "ship shape." The sturdy steel foolproof and fireproof containers are placed at various places, such as barracks, mess halls, the docks and ship yards, wherever materials (solids or liquids) need be deposited immediately as they accumulate. A Dempster-Dumpster truck hoisting unit quickly picks-up each container when it is filled and hauls it to the disposal area. Contents are automatically dumped and container returned.

If you have a materials handling problem demanding more cleanliness, more economy, and more efficiency, it will pay you to investigate the Dempster-Dumpster System—popularly used, not only by the armed forces, but by municipalities, leading industrial plants, and by large and small institutions of all kinds.

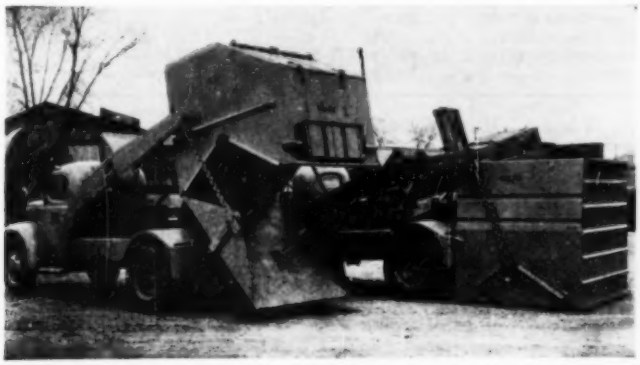


Photo above shows eleven hoisting units recently delivered to the U. S. Navy. Various types of containers are shown in carrying positions. Photo at left shows a hoisting unit preparing to lift a 10 cu. yd. Flat Top container, while another hoisting unit is dumping a 9 cu. yd. Trash and Rubbish Kolector type container. All controls of unit are conveniently located at the driver's seat. One driver and one truck handles any number of containers regardless of types.

DEMPSTER BROTHERS INC.

299 DEMPSTER BLDG.
KNOXVILLE 17, TENN.

FOR YOUR CONVENIENCE AND EASY IDENTIFICATION

we are now designating our Quality Line of Plasticizers as

"ELASTEX" PLASTICIZERS

BARRETT "ELASTEX" DCHP PLASTICIZER (Dicyclohexyl Phthalate)	
Color	White
Form	Granules
Odor	Moderate aromatic
Acidity (as Phthalic Acid), %	0.10 Maximum
Saponification Number	335-345
Melting Point, °C.	62-65
Containers	Fibre drums containing approximately 230 pounds net.
BARRETT "ELASTEX" 10-P PLASTICIZER (Diisooctyl Phthalate)	
Color	Clear, 100 Hazen Maximum
Form	Liquid
Odor	Characteristic
Acidity (as Phthalic Acid), %	0.01 Maximum
Specific Gravity, 20/20° C.	0.984 ±0.005
Saponification Number	280-290
Cloud test for water	Clear at 0° C.
Containers	50-55 gal. non-returnable steel barrels.
BARRETT "ELASTEX" 50-B PLASTICIZER	
Color	Clear, practically water-white (50 Hazen maximum)
Form	Liquid
Odor	Mild Ester
Distillation at 5 mm. Hg, °C.	189-222
Specific Gravity, 25/25°C.	1.076
Pounds per Gallon at 25°C.	8.95
Refractive Index at 20°C.	1.5071
Viscosity, Centipoises	467 at 5°C., 87.0 at 25°C., 22.8 at 50°C.
Containers	50-55 gal. non-returnable steel barrels.

BARRETT* CHEMICALS *Available* TO THE PLASTICS INDUSTRY

Dibutyl Phthalate
"ELASTEX" DCHP Plasticizer
"ELASTEX" 10-P Plasticizer
"ELASTEX" 50-B Plasticizer
Phthalic Anhydride
Phenol
Cresols
Cresylic Acids
Toluol

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.
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Which SEPARATION PROBLEM RESEMBLES Yours!

Acid Sludge • Blood • Caustic Soda • Chicle
Citrus Juices • Cooking Fat • Essential Oils
Fire Extinguisher Fluid • Fish Oil • Formaldehyde
Glue Liquor • Gluten • Irish Moss • Lacquer
Latex • Liver Oil • Olive Oil • Paint & Varnish
Penicillin • Pharmaceuticals • Printing Ink
Proteins • Serum • Starch • Streptomycin
Tomato Juice • Vegetable Oil • Wool Grease • Yeast

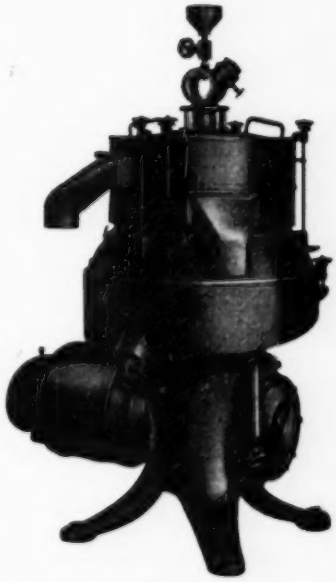
I can speed up your process, too

"I am De Laval Centrifugal Force. I have made many processes more profitable by making the separation or clarification step continuous. When centrifugal force can be used to replace slower, obsolete methods of separating two liquids, or removing solids from a liquid, I speed up operation, save labor and cut production costs.

"Can I go to work for you? It might pay you to see ——"

De Laval Centrifugal Force is applied through more than a dozen different types of centrifugal machines that make it possible to select exactly the right one for a given job.

From the large "Nozzle-Matic" with a separating capacity of 6,000 gallons per hour or even more, to the smallest model suitable for Laboratory or Pilot Plant work, De Laval machines completely meet the need for centrifugal machines.

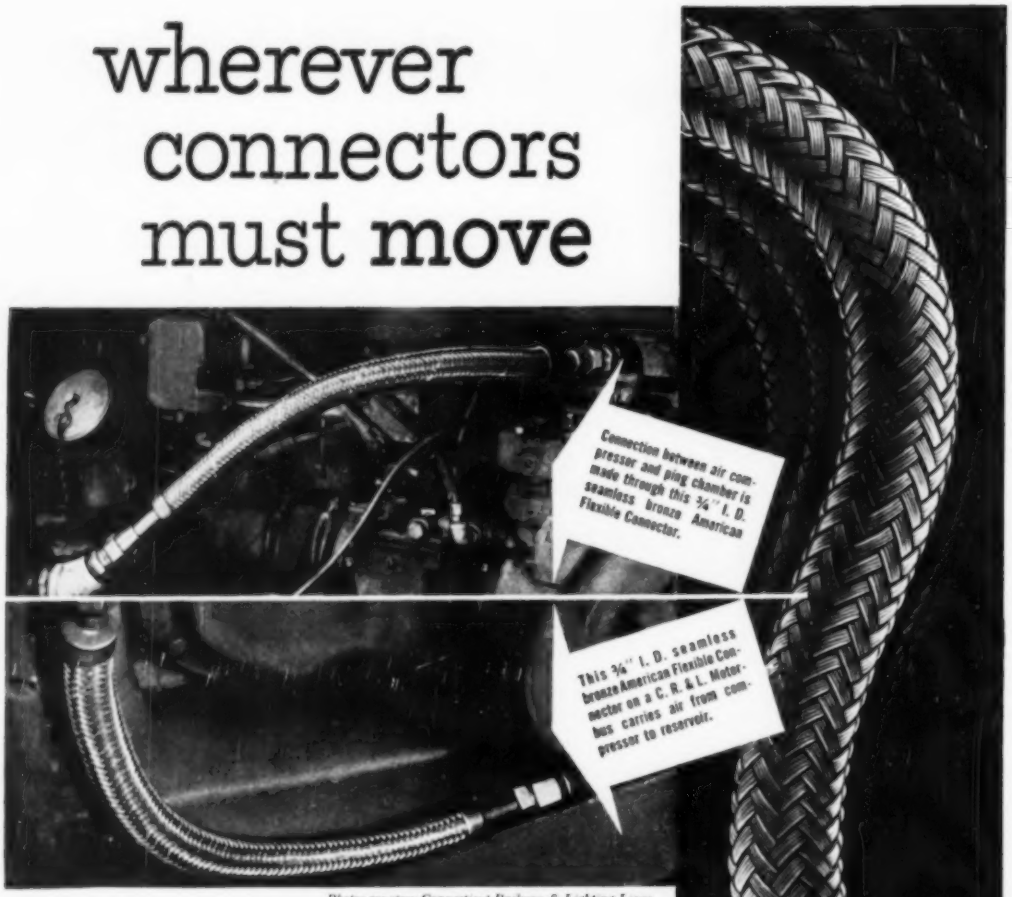


THE DE LAVAL SEPARATOR COMPANY
165 Broadway, New York 6 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5
THE DE LAVAL COMPANY, Limited, Peterborough, Ont.

De Laval Centrifugal Machines

FOR PROCESSING SYSTEMS

wherever connectors must **move**


Connection between air compressor and ping chamber is made through this ¾" I. D. seamless bronze American Flexible Connector.
This ¾" I. D. seamless bronze American Flexible Connector on a C. R. & L. Motorbus carries air from compressor to reservoir.

Photos courtesy Connecticut Railway & Lighting Lines.

Air-line piping for motorbus brakes and doors takes constant punishment from movement and vibration. In the piping illustrated here, American Seamless Flexible Metal Tubing provides safe, *flexible* connectors that can bend freely as the piping moves and vibrates.

There is a type and size for carrying fluids, steam, semi-solids, or gases. If yours is a special problem, American engineers offer you their long years of varied experience in connector applications.

For complete information on American Flexible Metal Hose and Tubing, write for literature. Address your inquiry to The American Brass Company, American Metal Hose Branch, Waterbury 88, Connecticut. In Canada, The Canadian Fairbanks-Morse Co., Ltd.

ANACONDA American

flexible metal hose and tubing

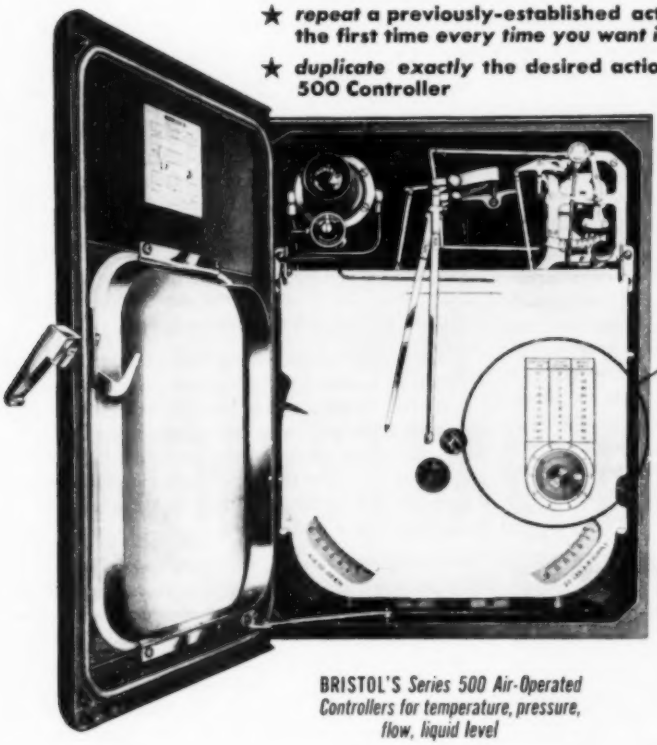
LIFT YOUR PROCESSING TO A **NEW HIGH** IN ACCURACY

WITH BRISTOL'S NEW CONTROLLERS

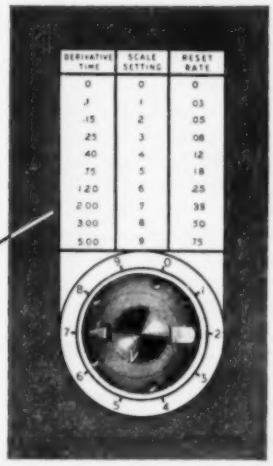
Here is a new automatic control instrument that will

★ ***repeat*** **a previously-established action exactly as it happened the first time *every time* you want it . . . or—**

★ ***duplicate exactly*** **the desired action in any like Bristol Series 500 Controller**



BRISTOL'S *Series 500 Air-Operated Controllers for temperature, pressure, flow, liquid level*



RESET, DERIVATIVE AND PROPORTIONAL TIME VALUES REPRODUCIBLE.

Adjustments are accurately calibrated and exactly reproducible. Similar settings in any Series 500 Controller will produce *exactly the same* values. This means you can replace controllers on a process with full assurance that such replacements will exactly duplicate the performance of the original. No more cut-and-try to arrive at the original setting . . . *saves hours by reducing shutdown time.*

These Features are NEW and EXCLUSIVE

SIMPLEST CONTROL SYSTEM TO SERVICE. Only one service adjustment is needed. The control units and parts making up the control system are so accurately designed and tolerances are so closely controlled that the system can be completely disassembled and reassembled, even with replacement parts, with only one simple adjustment needed to put the system in exact calibration. Almost anybody can service a Bristol Series 500 Controller.

FIVE TYPES OF CONTROL: on-and-off, proportional, proportional plus derivative, reset, reset plus derivative.

Investigate your new opportunity for accuracy and uniformity in automatic control. Write for new bulletin on Series 500 Air-Operated Controllers. THE BRISTOL COMPANY, 109 Bristol Road, Waterbury 91, Conn. (The Bristol Co. of Canada, Ltd., Toronto, Ont., Bristol's Instruments Co., Ltd., Lynch Lane, Weymouth, Dorset, England.)

60 YEARS...1889-1949

BRISTOL

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

COPPER ALLOY BULLETIN

CONDENSER AND HEAT EXCHANGER TUBING EDITION

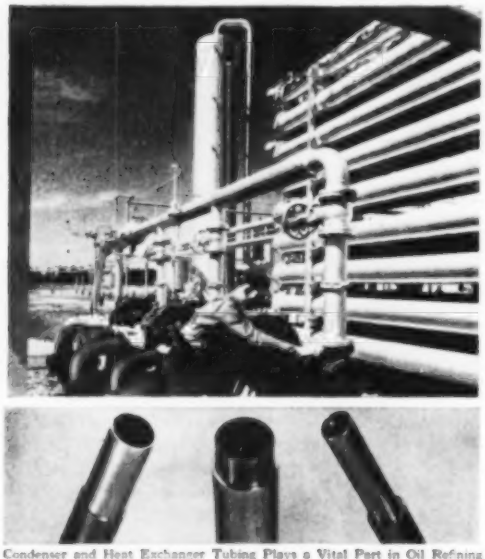
REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by BRIDGEPORT BRASS COMPANY "Bridgeport" *Headquarters for BRASS, BRONZE and COPPER*

Duplex Tubing for Oil Refinery Applications

Selection of a metal or alloy to withstand corrosive attack by a specific medium is generally possible, but the problem becomes more complex when two or more corrosive substances are involved.

Resisting H_2S Attack. Aluminum will resist hydrogen sulphide in petroleum liquids and is often recommended for heat exchanger tubes to withstand this gas as well as other sulphur compounds found in streams of hydrocarbon gases encountered in oil refining. However, Arsenical Muntz metal and Admiralty Brass tubes, despite the fact that hydrogen sulphide attacks them to some extent, will serve better in hydrocarbon streams where sodium hydroxide and similar bases have been introduced to neutralize various acids in the petroleum, as aluminum is attacked quite rapidly by sodium hydroxide. In other words, the attack of H_2S on the copper-base materials—Admiralty and Arsenical Muntz—is less than the attack of the hydroxides on aluminum.



Condenser and Heat Exchanger Tubing Plays a Vital Part in Oil Refining and Chemical Processing. Shown are Distillation and Heat Exchanger Equipment, Oil Pump and Absorber. Duplex Tubing Combats Double Corrosion.

Duplex Tubing for H_2S. While the petroleum condensate and gases may not be corrosive to aluminum, the tubing is often affected by the circulating water. Some fresh cooling waters as well as sea water contain chlorides ($NaCl$, $MgCl_2$ etc.) which are quite corrosive to aluminum. Under such conditions, Duplex Tubing with aluminum to the petroleum side and Admiralty, Aluminum Brass, Red Brass, and Copper to the water-side should be tried out. In this way the best characteristics of both materials are utilized.

Ammonium hydroxide is also used for neutralizing acidic substances in streams of hydrocarbon gases. Such treatment is generally beneficial to Admiralty. Under certain conditions, however, it has been found advantageous to use Duplex Tubing—steel to the ammonia-laden gas side and Red Brass to the fresh water-side especially where the concentration of ammonia in the gases is relatively high and the concentration of sulphur is relatively low.

Duplex Tubing for Mercury. On rare occasions mercury may be introduced into the stream of hydrocarbon gases either from the crude or due to contamination from equipment containing mercury. Liquid mercury, deposited on the cool surface of the tubing, is likely to cause trouble by intergranular penetration of stressed brass tubing. When the source of mercury is from the crude, Duplex tubing with steel to the mercury-laden gas side and a copper-base alloy to the water-side appears to be a likely solution. This is based on the wide and successful use of steel in contact with liquid mercury.

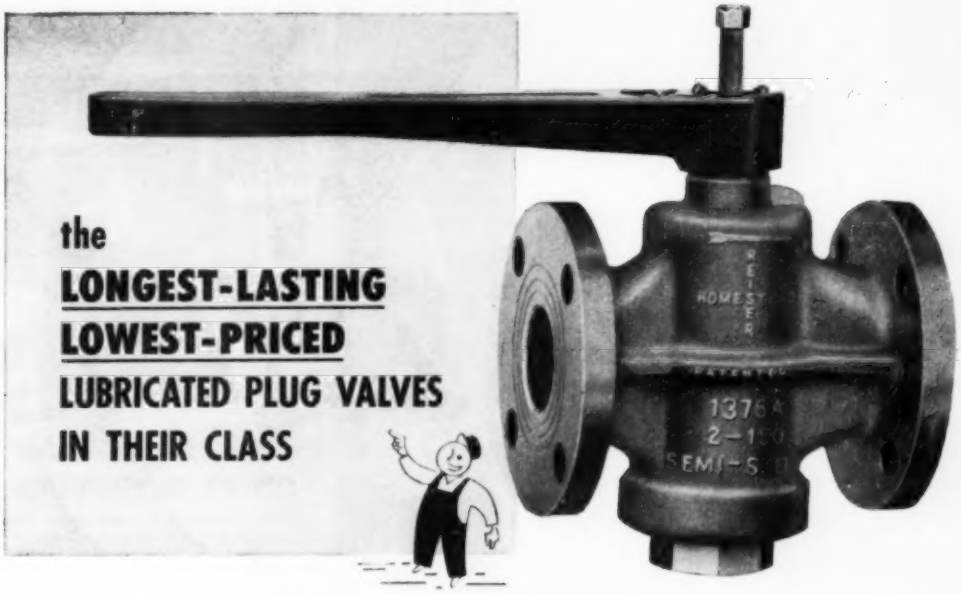
Because aluminum is commonly used for cooking utensils, it is often specified for handling food products. We have in mind a heat exchanger unit using Duplex Tubing—Aluminum and Admiralty—for handling coffee concentrate. Unfortunately, this was strongly alkaline in nature and quickly attacked the aluminum and had to be discarded. That alkalis attack aluminum is not unknown and emphasizes the importance of making a thorough study of the corrosion problem at hand before specifying any particular metal or alloy.

Duplex tubing is made in many combinations such as steel, stainless, nickel, lead, aluminum with Admiralty, Aluminum Brass, Duronze (Aluminum Bronze), Cupro Nickel and Muntz metal.

BRIDGEPORT BRASS

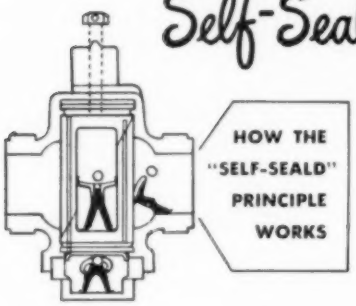
BRIDGEPORT BRASS COMPANY, BRIDGEPORT 2, CONN. • *ESTABLISHED 1865*

Mills at Bridgeport, Connecticut, and Indianapolis, Indiana • In Canada: Noranda Copper and Brass Limited, Montreal



HOMESTEAD-REISER

Self-Sealed LUBRICATED PLUG VALVES



In addition to a full lubricant seal around the ports and around the top and bottom of the valve, the wedge-action of the plug under line pressure, constantly presses the finely-finished surfaces of the plug outward against the seating surfaces of the body. This self-sealing action keeps the plug surfaces in contact at all times with the mirror-like bore of the body. The plug thus automatically adjusts itself for wear, assuring extra long life and maximum leakless service.

In both screwed and flanged types, Homestead-Reiser Valves are the lowest-priced, full-port-area valves in the 200 lb. oil-water-gas, 150 lb. steam working pressure class.

They provide:

- **100% area of standard pipe**
- **100% lubricant seal around ports**
- **Patented "Self-Seald" Principle with *automatic adjustment for wear***
- **Single lubricant for wide variety of applications**
- **Extreme economy of lubricant**

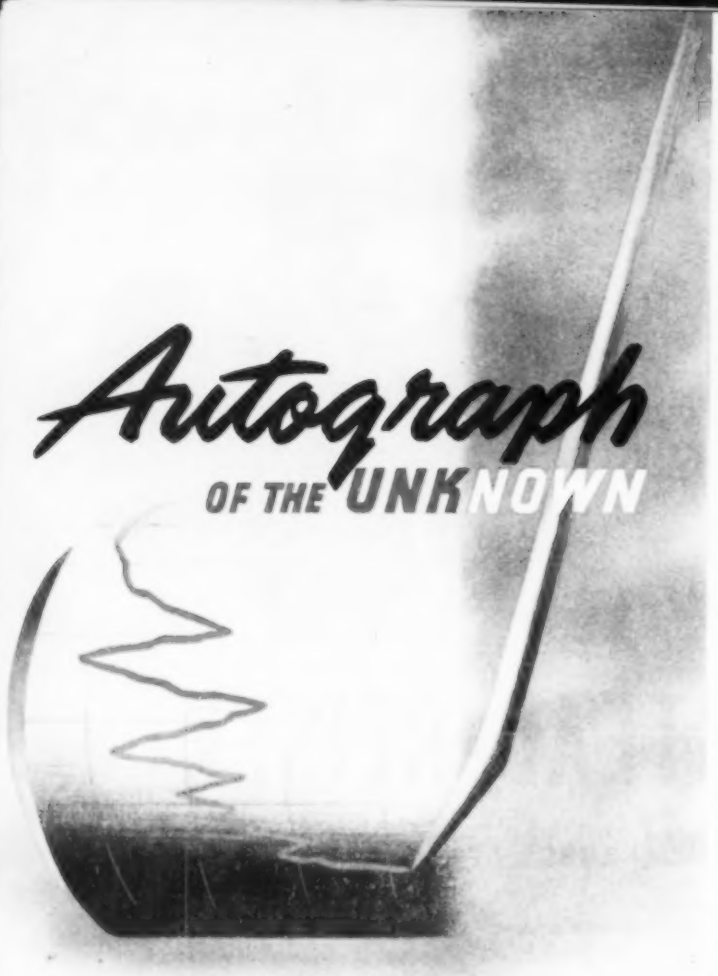
We designed and built Homestead-Reiser Valves to outlast all other lubricated plug valves in their class. Their ability to do so, and their superior performance in service, have been established in practically every industry during the past seven years.

For full details write for Catalog 39—Section 5

HOMESTEAD VALVE MANUFACTURING CO.

"Serving Since 1892"

P. O. BOX 13 **CORAOPOLIS, PA.**



Autograph OF THE UNKNOWN

The infrared spectrogram written by the Baird Associates spectrophotometer includes the autograph of each component in a complex mixture of gases or liquids, as well as in some solids, — revealing, by characteristic absorption bands, the presence of even small quantities of the separate substances which compose the mixture.

This analytical method is rapid, simple, dependable — of demonstrated value to chemists in diverse industries. Write for bulletin XXX describing the double-beam infrared recording spectrophotometer and its uses.

Baird Associates will gladly confer with you regarding the application of this instrument to your needs.

Baird Associates, Inc.

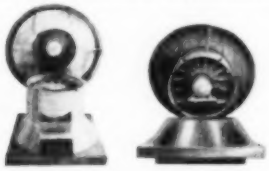
33 UNIVERSITY ROAD CAMBRIDGE 38, MASS.

In Gale or Storm
CONTROLLED VENTILATION!

Now, regardless of wind, snow, sleet or rain have positive, controlled ventilation with POWER-FLOW ROOF VENTILATORS.

GREATER AIR DISCHARGE PER H.P.
Non-overloading, AXIAL-FLOW fan in aerodynamically correct housing, exhausts more air per brake horsepower than other roof ventilators. POWER-FLOW works efficiently with or without a duct system.

EASY ACCESS FOR INSPECTION
POWER-FLOW Roof Ventilators are hinged in two places. See illustrations below. All working parts easily accessible for inspection and lubrication.



(With Head Open) (With Housing Open)

Provide your buildings with positive, *controlled* POWER-FLOW ventilation. All POWER-FLOW capacity ratings are certified according to PFMA code.

Power-Flow ROOF VENTILATORS

SEND FOR FREE CATALOG

DE BOTHEZAT FANS DIVISION, Dept. CE-9
American Machine and Metals, Inc.
EAST MOLINE, ILLINOIS

Please rush, without obligation, new illustrated catalog and data on POWER-FLOW Roof Ventilators.

Firm _____

Address _____

State _____ Zone _____

City _____

Sender's Name _____

5¢

MAY SAVE YOU $1,000——

(NO FOOLING!)

The price of a phone call—which may be 5c or $5—may well save you $1,000. or $5,000., if you make that call at the right time and to the right place.

The right time is when you are speculating over a new process and considering the possible methods of drying, as related to your other processing equipment. The right place is to Proctor & Schwartz, Inc., of Philadelphia, designers and manufacturers of industrial drying equipment. The right number is MIchigan 4-6400.

This message is prompted by actual occurrences where Proctor engineers were able to answer certain questions by telephone which saved clients hours of development work which otherwise may have proceeded along the wrong lines. This isn't some idea dreamed up by the advertising department to increase inquiries . . . it's a message intended to help you get off to the right start in your considerations of a new process. It is intended to point out to you, a few things you may not think of otherwise—and to drive home to you the truth that 5c spent for a city phone call—or $5 spent for a cross country call, may turn out to be the best nickel or $5 bill you ever invested.

First of all—early consideration of drying equipment is of the utmost importance, if that equipment is to fit into an over-all process line. It may well have an important bearing on the preliminary and subsequent equipment—so that it pays in dollars and cents to know something about the basic type of drying system that you are planning to use at the same time you consider each of the other steps in the process.

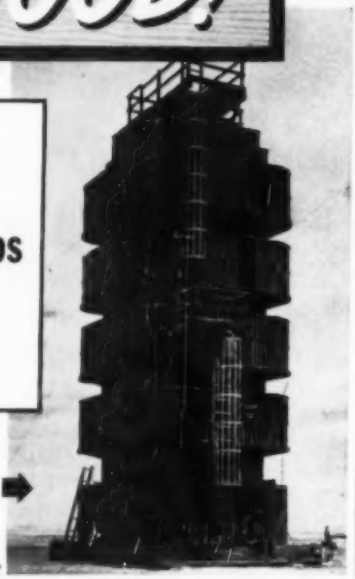
You may find it desirable to know something about the approximate dryer investment to accomplish a given end. A telephone conversation with a Proctor engineer may help you determine whether the probable investment be such that it is worth pursuing your plans further—or dropping the idea altogether . . . in which case, needless hours of time and manpower may be saved.

Does it make sense to you that Proctor engineers are more interested in helping you solve problems . . . more concerned with saving you money and effort than with merely selling equipment? Does it seem logical for us to suggest, when you have an important problem—it may well pay you to pick up the phone and ask for MIchigan 4-6400, in Philadelphia? It has saved many people many dollars. You may be next.

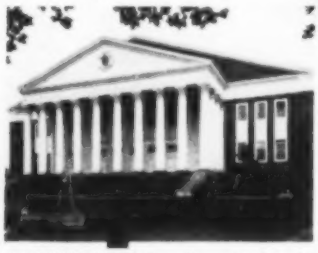
PROCTOR & SCHWARTZ, INC.
711 TABOR ROAD
PHILA. 20, PA. • MIchigan 4-6400

REDWOOD!

No other wood does so many jobs so well!



IN INDUSTRY! This dependable cooling tower of Redwood gives long, efficient service in the torrid Kettleman oil fields of Southern California. A dramatic example of Redwood's ability to resist decay and organic growth, to endure intermittent wetting and drying and high temperatures without warping.



IN ARCHITECTURE! Redwood goes Greek in this Corinthian portico on the University of Maryland's gymnasium. Here, curved sections of Redwood have been glued together to form graceful, hollow columns. Redwood's workability, gluability and paintability make it a favorite of both home and industrial architects.

Photos courtesy of Standard Oil of California, Van Keppel Green, Hartmann-Sanders Co.

IN MANUFACTURING! Unique garden furniture created by famed American designers features Redwood, hand rubbed with a special finish to preserve its warm, soft, rose tone. Few woods present a greater variety of decorative possibilities, both indoors and out, than Redwood, with its easy working qualities, its durability, and its natural beauty of grain and color.

★ On your trip to California visit some of the Redwood Parks and National Forests, where over 72,000 acres of Redwoods have been permanently set aside for public use.

California Redwood

THE WONDER-WOOD OF INDUSTRY

Perhaps Redwood can do your job better! Why not check and see? Interesting data available on many uses of Redwood, including:

IN INDUSTRY
- ___ Cooling Towers
- ___ Tanks & Vats

Redwood on:
- ___ The Brewery
- ___ The Chemical Plant
- ___ The Distillery
- ___ The Food Products Plant
- ___ The Petroleum Industry
- ___ The Paper and Pulp Mill
- ___ The Soap Plant
- ___ The Tannery
- ___ The Textile Plant

IN MANUFACTURING
- ___ Laminated Uses
- ___ Linoleum
- ___ Furniture Cores
- ___ Window & Sash Frames
- ___ Pattern Stock & Foundry Uses
- ___ Cigar & Candy Boxes

IN ARCHITECTURE
- ___ Home Architecture
- ___ Church Architecture
- ___ Garden Architecture
- ___ Farm Structures
- ___ Architectural Decoration

(Fill in other problems) _____

- California Redwood Association
  405 Montgomery Street
  San Francisco 4
- *Gentlemen: Please send me data checked.*
- *Name* _____
- *Company* _____
- *Address* _____

Everyone has problems

If yours happens to be a source of supply for a more stable and concentrated crystalline trisodium phosphate . . . *Investigate*

VICTOR TRISODIUM PHOSPHATE, HEXAHYDRATE

Victor trisodium phosphate, hexahydrate, is a recently developed Victor product now available in commercial quantities. Formula: $Na_3PO_4 \cdot 6H_2O$. Melting point, 110° C. Colorless, free-flowing crystals. *A stable hydrate of normal trisodium phosphate.* 1% water solution has pH of 11.6. It is suggested for use wherever a more stable and concentrated crystalline trisodium phosphate is desired. Write or fill in and mail the handy coupon for experimental sample.

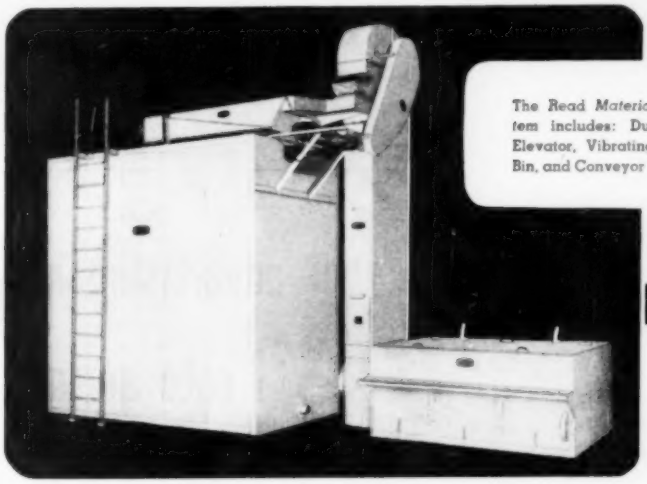
VICTOR CHEMICAL WORKS
141 West Jackson Boulevard, Chicago 4, Illinois.

Investigate Now! MAIL THIS COUPON TODAY!

Victor Chemical Works
141 West Jackson Blvd., Chicago 4, Illinois
Please Check
☐ Sample of trisodium phosphate, hexahydrate.

Name _____ Title _____
Company _____
Street _____
City _____ Zone _____ State _____
V-4

Read the Facts about READ Chemical Equipment



The Read *Material Handling System* includes: Dump Bin, Bucket Elevator, Vibrating Sifter, Storage Bin, and Conveyor (not illustrated).

COORDINATED MOVEMENT FOR LOWER COSTS

. . . this System provides smooth, efficient operation

IN MATERIAL HANDLING . . . particularly of powdered or granular material, you need perfectly coordinated movement through the Material Handling System to keep operation costs in line. This is where *Read* excels . . . with a System literally custom-built to your individual requirements.

READ Material Handling System Advantages:

- Entire system designed for *coordinated operation*. Results: lower operating costs and increased production, year in and year out.
- *Removable panels* throughout system for easier cleaning and inspection.
- Dump Bin is readily charged from bags or barrels.
- Bucket Elevator is dust-proof . . . has sealed bearings.
- Vibrating Sifter provides combined horizontal and vertical motion to assure equal distribution over the screen.
- Storage Bin is equipped with distributing conveyor to utilize available volume; also a graduated discharge screw to obtain equal discharge from all portions of the bin.

BRING YOUR MATERIAL HANDLING PROBLEMS TO READ

WHAT'S YOUR NEED?

CALL ON. . .

Write for literature on Read **Material Handling Systems** . . . state your specifications and requirements.

MAKERS OF READCO CHEMICAL EQUIPMENT

READ MACHINERY DIVISION

of THE STANDARD STOKER COMPANY, INC.
YORK, PENNSYLVANIA

One of a series of messages to help you increase your understanding of business paper advertising, and its effect on your job.

Does your advertising manager rate an invitation to the management table?

IF YOU SHOULD ASK *him*, he'd probably say "yes." And his reasoning might run something like this:

Management's first responsibility is to show a fair profit. This requires a relentless search for continued improvement – in design, in purchasing, in production, research and cost-accounting. Each deserves its place at the management table. Yet none of these activities can actually create a dollar of profit, for the simple reason that you can't *produce* anything at a profit – not unless you can also *sell* it.

And that's what makes the advertising manager's job so important.

His first responsibility is to see that your company's products are made familiar (and desirable) to the greatest number of prospects, at the lowest possible cost. In fulfilling this responsibility, he sets a parallel course with the sales department, although his approach more closely resembles that of the assembly line technician.

For advertising, as he sees it, is simply the application of assembly line techniques to the *manufacture of a sale*. Just consider the five basic steps involved:

1. **Seeking out prospects**
2. **Arousing their interest**
3. **Creating a preference for your product**
4. **Making a specific proposal**
5. **Closing the order**

By *mechanizing* the first three of those steps, advertising increases management's chance to show a profit. It leaves your salesmen free to concentrate on the two jobs which they alone can do, and do best.

And nowhere does this mechanizing process operate more efficiently than in the business press, where it reaches your best prospects at the lowest possible cost.

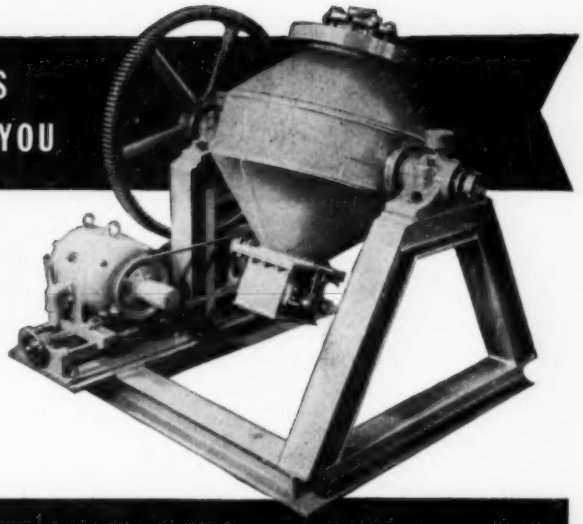
Perhaps that's why so many smart advertising managers are partial to business paper advertising – and why more of them, incidentally, are getting to sit at the management table!

CHEMICAL ENGINEERING
With Chemical & Metallurgical Engineering
A McGraw-Hill Publication
330 West 42nd Street New York 18, New York

THE ASSOCIATED BUSINESS PAPERS
205 East 42nd Street, New York 17, N. Y.

ABP's BUSINESS IS TO BOOST YOUR BUSINESS

LET US MAKE THIS BLENDING TEST FOR YOU



BLAW-KNOX makes a standing offer to run a test quantity of your materials through a Blaw-Knox Tumbling Blender, without expense to you. Such a demonstration will prove this unique machine's ability to produce uniform mixtures quickly and economically regardless of variations in grain size, shape of particles, or gravities of the materials used.

Blaw-Knox Tumbling Blenders are available in a full range of sizes and a series of metals and alloys. Literature and full information will be supplied on request.

BLAW-KNOX DIVISION
OF BLAW-KNOX COMPANY
2090 Farmers Bank Bldg. • Pittsburgh 22, Pa.

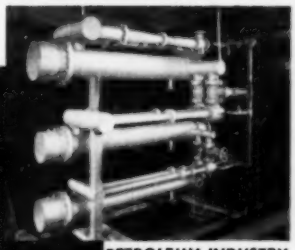
BLAW-KNOX

IF YOU USE VACUUM IN YOUR PROCESS THE MODERN GRAHAM SINGLE NOZZLE EJECTOR WILL GIVE YOU IMPROVED OPERATION

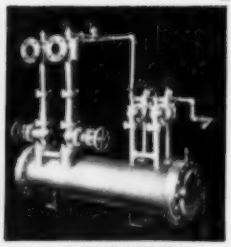
Write for Bulletin 56A

The present Graham single nozzle ejector is the result of constant research since 1915.

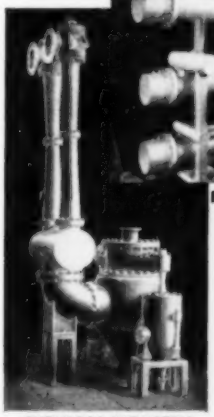
Today, we are able to offer industry the finest steam jet ejector made—high capacity, low steam consumption, stable operation at all loads, maintenance nil, off-the-shelf delivery for most sizes, and all at the right price.



PETROLEUM INDUSTRY



PUBLIC UTILITY



CHEMICAL INDUSTRY

FOOD INDUSTRY

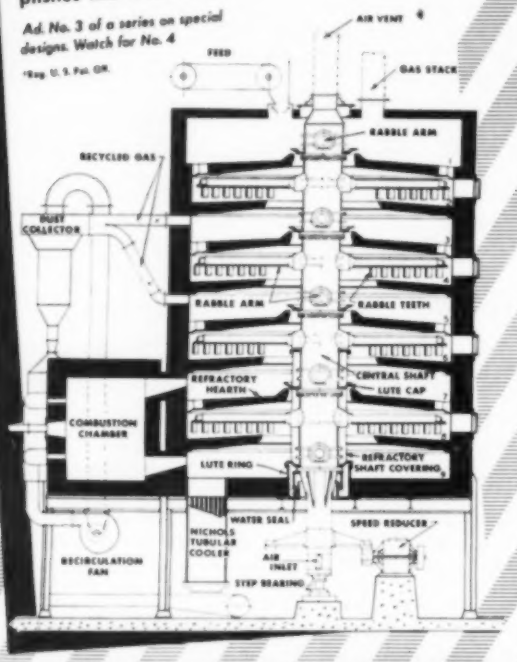
GRAHAM MANUFACTURING CO., INC. • 415 LEXINGTON AVE., NEW YORK 17, N.Y.

NICHOLS Furnaces with gas recirculation

NICHOLS HERRESHOFF* and BETHLEHEM WEDGE* multiple hearth roasters and calciners can be supplied with gas recirculation as an added means for the control of temperature and/or atmosphere. Exit gas or gas from any hearth can be reintroduced into these furnaces. Illustration shows gases exiting from hearths 3 and 5 and re-entering at hearths 7 and 9 through a combustion chamber. Very low oxygen in the combustion gases is thus secured without excessive temperature. For some applications direct recirculation from one hearth zone to another hearth zone without an external combustion chamber accomplishes the desired control.

Ad. No. 3 of a series on special designs. Watch for No. 4

*Reg. U. S. Pat. Off.



NICHOLS ENGINEERING & RESEARCH CORP.

70 PINE STREET · NEW YORK 5, N. Y.

Pacific Coast office: 40 S. LOS ROBLES AVE. PASADENA, CALIF.

In Canada: 1477 SHERBROOKE STREET, WEST, MONTREAL 25

Everyone has problems

If yours happens to be an emulsifier for process cheese, or dairy products . . . *Investigate*

VICTOR DISODIUM PHOSPHATE, DUOHYDRATE

Disodium phosphate, duohydrate is a product recently added to the Victor phosphate family. At present, it finds its greatest application as an emulsifier for process cheese, and evaporated milk. In each of these cases, disodium phosphate, duohydrate produces a smooth and creamy product. The important advantages of this Victor phosphate are its rapid solubility, free-flowing character, extremely high purity, and uniformity. Investigate Victor disodium phosphate, duohydrate today! Your request for an experimental sample or quotation will be given prompt attention.

VICTOR CHEMICAL WORKS

141 West Jackson Boulevard, Chicago 4, Illinois.

Investigate Now! V-4 MAIL THIS COUPON TODAY!

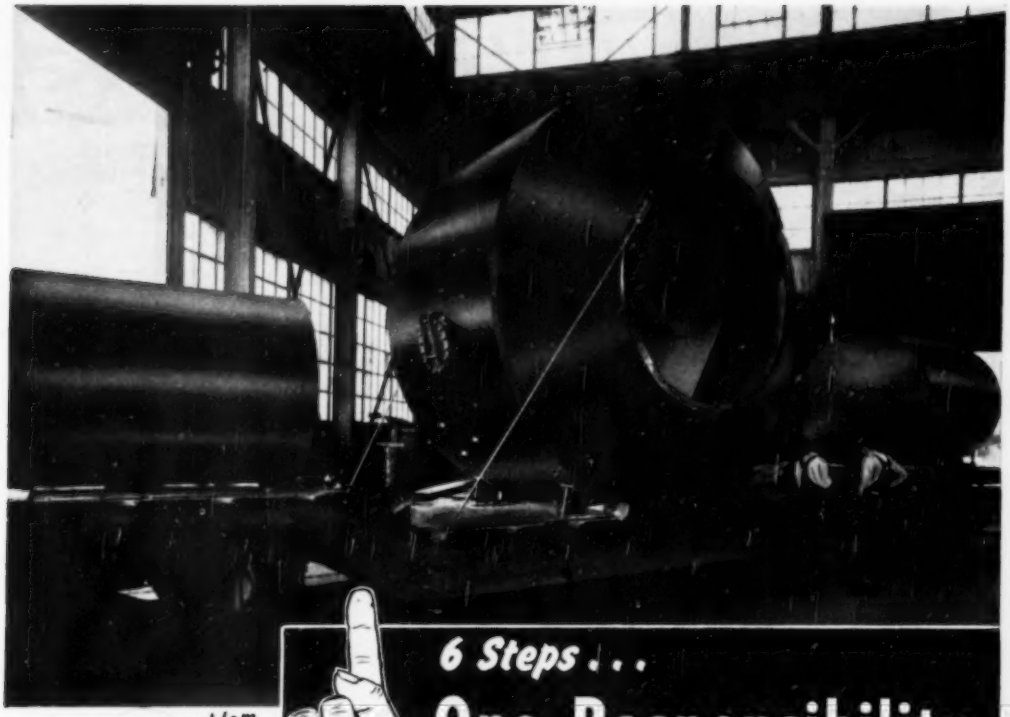
Victor Chemical Works
141 West Jackson Blvd., Chicago 4, Illinois
Please check
☐ Sample of disodium phosphate, duohydrate.
☐ Please quote prices for 100 lb. bag.

Name _____ Title _____

Company _____

Street _____

City _____ Zone _____ State _____



6 Steps . . .
One Responsibility

Analysis of problem, design and engineering detail

Founding, welding, machining, complete construction

Assembly, match marking, testing, crating and painting for protection

Loading and routing for prompt delivery

Installation inspection, start-up, performance check

Periodic inspections and consultations

From design to the mill—G-B follows through

Competent, experienced personnel in every phase of customer service enables G-B to offer.

1—Efficiency and economy of operation through the best in design practice as dictated by years of experience and know-how.

2—Accuracy and durability in equipment through utilization of completely modern equipment in all production departments.

3—Prompt, undamaged delivery of all equipment, large or small, through careful analysis of shipping problems—loading, routing and clearances.

This completely integrated service coupled with regular inspection and service calls by capable engineers assures uninterrupted, trouble-free service for many years.

When you call in G-B from the start, you assure the success of your expansion or modernization program. Consultation engineers are available without cost or obligation.

GOSLIN-BIRMINGHAM MANUFACTURING CO., Inc.

BIRMINGHAM, ALABAMA

NEW YORK:..... GOSLIN-BIRMINGHAM, 350 Madison Ave., NEW YORK 17, N. Y.

CHICAGO:.....F. M. deBEERS and ASSOCIATES, 20 N. Wacker, CHICAGO, Ill.

HAWAII:.....P. S. PELL and COMPANY, Ltd., 88 S. Queen St., HONOLULU 6

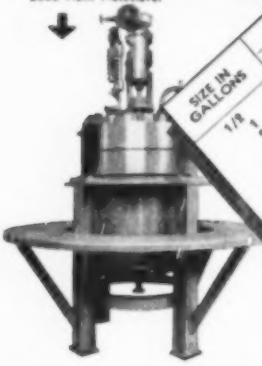
BLAW-KNOX AUTOCLAVES

STANDARD SIZES AND PRESSURES FOR AUTOCLAVES AND KETTLES

PRESSURE IN P.S.I.

SIZE IN GALLONS	15	125	250	500	1000	1500	2000	2500	3000
1/8									
1									
5									
10									
50									
80									
125									
250									
350									
500									
1000									
1500									
2000									

Blaw-Knox 125 Gal. x 2000 P.S.I. Autoclave.



Blaw-Knox High-Pressure Autoclave with Quick-Opening Closure.

CONSTRUCTION FEATURES

- Advanced Welding Techniques.
- Thorough Testing and Inspection.
- Simplicity and Ruggedness for Long Service.
- Built for Maximum Safety.

DESIGN FEATURES

- Efficient Agitation.
- Quick Heating and Precise Control.
- Quick-Opening Closures.
- Flush-Plug Discharge Valves.
- Leak-Proof Stuffing-Boxes.

BLAW-KNOX

DIVISION OF BLAW-KNOX COMPANY

2090 Farmers Bank Building, Pittsburgh 22, Pa.

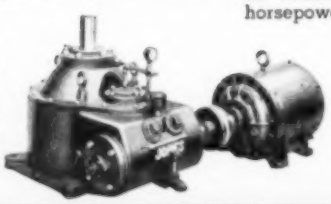
New York - Chicago - Philadelphia - Birmingham - Washington

For driving agitators, mixers and similar equipment—

JONES WORM-HELICAL SPEED REDUCERS

HERE is a line of machines that fills a long felt need for double reduction units of the fully enclosed type to be used for agitators, mixers, etc. requiring a vertical shaft drive.

Many of these Jones units have established excellent performance records in a wide variety of service. As a result of that experience a complete standard line has been developed covering 15 standard ratios ranging from 40 to 1 to 250 to 1 for all common motor speeds and a wide range of horsepower ratings.



• This Jones Worm-Helical Speed Reducer on a lacquer agitator is typical of the wide range of services for which these drives can be used such as ore roasters, pulp tank mixers, furnaces, bending rolls and similar applications.

The new Jones Bulletin No. 75 covers complete details on these new Worm-Helical Speed Reducers, with rating tables, dimension diagrams, torque charts and other application information. We shall be pleased to send you a copy.

W. A. JONES FOUNDRY & MACHINE CO.

4415 Roosevelt Road, Chicago, Illinois

Jones

HERRINGBONE—WORM—SPUR—GEAR SPEED REDUCERS • PULLEYS
CUT AND MOLDED TOOTH GEARS • V-BELT SHEAVES • ANTI-FRICTION
PILLOW BLOCKS • FRICTION CLUTCHES • TRANSMISSION APPLIANCES

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Cut your processing costs to a new low with the Trerice Self-Operating Regulator. This dependable, experience-proven regulator provides trouble-free control . . . eliminates over-heating! Saves you steam, fuel and labor while affording improved "quality control" over your product. Your low, initial investment in the Trerice Self-Operating Regulator and its companion piece, the Trerice Dial Thermometer, will be repaid many times over during their first year of service.

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Advertising men agree—the list is more than half the story

McGraw-Hill Mailing Lists used by leading manufacturers and industrial service organizations, direct your advertising and sales promotional efforts to key purchasing power. They offer coverage of major markets, including new personnel and plants. Selections may be made to fit your own special requirements.

New names are added to every McGraw-Hill list daily. List revisions are made on a twenty-four hour basis. And all names are guaranteed accurate within two per cent.

In view of present day difficulties in maintaining your own mailing lists, this efficient personalized service is particularly important in securing the comprehensive market coverage you need and want. Ask for more detailed information today. You'll probably be surprised at the low over-all cost and the tested effectiveness of these hand-picked selections.

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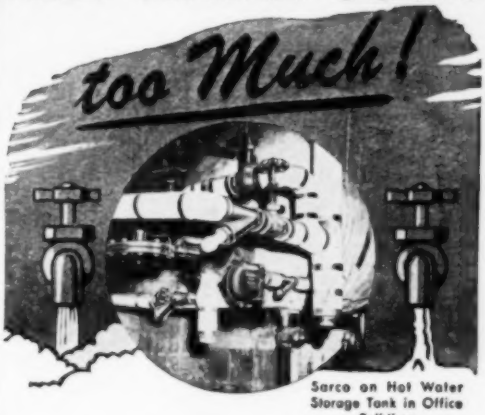
330 WEST 42nd ST. NEW YORK, N.Y.

HOT WATER COSTS



Sarco on Hot Water Storage Tank in Office Building

WHEN IT'S TOO HOT OR TOO COLD

Hot water is a critical service, in buildings, in homes, or in industry. Poor service can be "explained" for a time. But when tenants get scalded, or workers "wait for it to warm up" because the water is too cold, things begin to happen that cost you money every day.

Sarco Blender in Apartment

THE SARCO WATER BLENDER

TANKS

If you have a storage tank — any one of several Sarco Trap-Control combinations will insure constant tank temperatures. Sarco never overheats — therefore it saves fuel.

APARTMENT

"We put in a Sarco Blender at a cost of less than a dollar per apartment — now no complaints and much less water is wasted waiting for it to get right."

INDUSTRIAL APPLICATIONS

The Sarco Water Blender is doing a good job in industry too. It insures exact temperatures at the point of use. In foods, it saves raw materials and rejected batches by having the water just right at the cooker or mixer. It is used for recirculating brine and cooling water in engines and compressors, and is the standard for wash rooms and gang showers. Bulletin No. 800.

254

SARCO
SAVES STEAM

SARCO COMPANY, INC.
Represented in Principal Cities
Empire State Building, New York 1, N.Y.
SARCO CANADA, LTD., TORONTO 5, ONTARIO

IMPROVES PRODUCT QUALITY AND OUTPUT

One of a series of messages to help you increase your understanding of business paper advertising, and its effect on your job.

What's so glamorous about advertising?

THERE IS A curious belief in some quarters that advertising lives in a glamorous and almost occult world of its own, quite insulated against the cold science of the production line.

That, of course, is pure Hollywood.

Advertising today (in the *business* press, at least) is about as glamorous as a drop forge, and twice as efficient. It can become just as important to your profit-and-loss picture as plant maintenance, safety engineering, production techniques or cost-accounting. Maybe even a little more so.

Because the biggest plant capacity, and the best production know-how, can't create a single dollar of profit—*not until something is sold.* And selling, in our economy, is a mass production job!

Advertising simply provides the necessary machinery. It is the application of assembly line methods to the *manufacture of a sale.* For sales don't just "happen." Like any other commodity, they require a series of processing operations. Usually, it takes five:

1. **Seeking out prospects**
2. **Arousing their interest**
3. **Creating a preference for your product**
4. **Making a specific proposal**
5. **Closing the order**

By *mechanizing* the first three of these operations, advertising enables your salesmen to concentrate on the two jobs which they alone can do, and do best. And nowhere does the machinery of advertising work more efficiently than in the business press, where it reaches the greatest number of interested prospects, at the lowest possible cost.

Maybe – to the man who appreciates machinery – advertising is a pretty glamorous business, at that!

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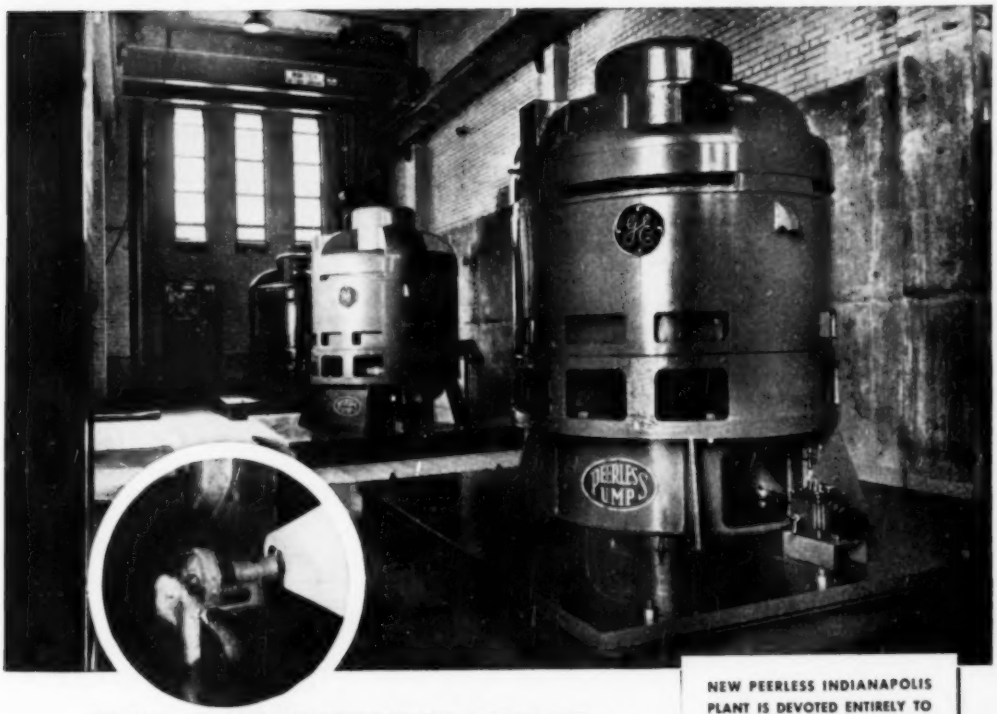
With Chemical & Metallurgical Engineering
A McGraw-Hill Publication
330 West 42nd Street New York 18, New York

THE ASSOCIATED BUSINESS PAPERS
205 East 42nd Street, New York 17, N. Y.

ABP's BUSINESS IS TO BOOST YOUR BUSINESS

WIDEST CAPACITY RANGE



FROM A COMPREHENSIVE LINE OF VERTICAL AND HORIZONTAL PUMPS

Peerless offers 2 to 220,000 gallons per minute

A tapful or a torrent! No matter what your water capacity requirements are, Peerless can meet your pumping needs.

Fractional hp horizontals, like the Peerless "Fluidyne" pumps handling cooling-jacket water in the inset above, furnish a few gallons a minute. The huge Peerless mixed-flow pumps in the larger photo, pump away drainage water at the rate of tens of thousands of gallons a minute.

Widest capacity range is but one of a host of reasons why industries, municipalities and commercial businesses plan with Peerless for all their needs for pumps. Here are others:

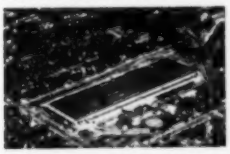
ALL PRACTICAL HEADS: Lifting water from 1000 feet or more is a practical accomplishment of Peerless vertical deep well pumps. Pumping against heads of 690 feet is a common task for Peerless horizontal centrifugal pumps.

ALL TYPES OF DRIVE: Electric motor, right angle gear, engine, belt (V or flat) or combinations of the above, are all available from Peerless, with pump and driver engineered as a unit.

MODERN DESIGN: Peerless pumps are designed for top flight performance over extended periods of time. And the practical consideration of ease of maintenance and repair is figured in to their functional, good looking design.

NATIONWIDE SERVICE: Peerless sales and field service is available in all principal U. S. cities and abroad. Plan with Peerless for all your pumping needs. Individual bulletins on all types of Peerless Pumps are available upon request.

NEW PEERLESS INDIANAPOLIS PLANT IS DEVOTED ENTIRELY TO PUMP PRODUCTION AND SERVICE



Here is one of America's newest pump plants—19 acres of modern manufacturing facilities devoted to precision production of horizontal and vertical pumps, centrally located at Indianapolis. Plan with Peerless for pumps plus fast, complete pump service.

fmc

PEERLESS PUMP

PEERLESS PUMP DIVISION
FOOD MACHINERY AND CHEMICAL CORPORATION
Los Angeles 31, California — Indianapolis, Indiana
District Offices: New York 5, 37 Wall Street; Chicago 40, 4554 N. Broadway; Atlanta Office: Rutland Bldg., Decatur, Ga.; Omaha, Nebr., 4330 Leavenworth Street; Dallas 1, Texas, 3905 Elm Street; Fresno, Calif.; Los Angeles 31, Calif.

Peerless
VERTICAL AND HORIZONTAL
Pumps

What Makes A Mailing *CLICK?*

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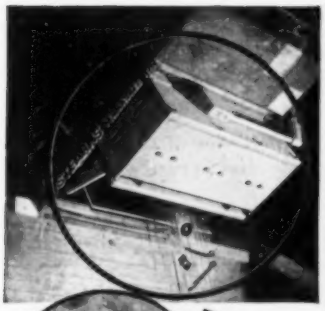
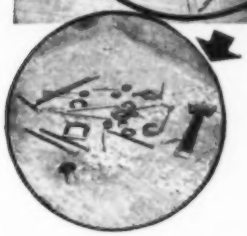
to check, each issue, the announcements appearing in this
WHERE TO BUY SECTION
They supplement other advertising in CHEMICAL ENGINEERING of products and services essential to modern chemical plant operation.





PROTECT YOUR MACHINERY!

JUST FOUR HOURS of operation recovered this amazing amount of tramp iron at the Fleischmann Malting Company with a Stearns Electro-Magnetic Spout Type Separator. Protect your machinery, avert possible shut-downs and costly repairs — remove all the tramp iron with a Stearns separator.

Tramp iron is automatically discharged by simply opening and closing the control switch. No time is lost, no hand scraping.

For continuous maximum magnetic strength, select a Stearns separator. No tramp iron can escape their deep, strong field. Low initial and operating costs.

For complete specifications and operating data on Stearns Electro and Permanent Magnetic Spout Type Separators, write for bulletins.

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629 So. 28 St., Milwaukee 4, Wis.

Outstanding among its great variety of mineral resources readily available for chemical manufacturing is Oklahoma's tremendous reserve of high grade silica, in several forms:

Glass Sand. Equal in chemical quality to any in the United States and used by glass plants in Oklahoma and adjacent states since 1913.

Tripoli. This state has long been an important supplier of tripoli, in 1944 ranking third in national production.

Novaculite. Outcroppings of more than 100 square miles in southeastern Oklahoma are a continuation of the outcrops in southwestern Arkansas where novaculite has been produced for many years and where chemical analysis shows silica content to be 99% or more.

Vein Quartz. Very large deposits of milky variety are easily accessible.

Chat and Slimes. Millions of tons of highly silicious material are available as by-products of zinc mining in northeastern Oklahoma.

TYPICAL ANALYSIS OF SILICA GLASS SAND FROM ARBUCKLE MOUNTAINS

Average of Plant Run — 1947

SiO_2	99.829
Fe_2O_3	0.036
Al_2O_3	0.072
CaO	0.009
MgO	0.005
L. O. I.	0.072
Total	100.023

Detailed information on Oklahoma's mineral resources is available on request, based on data by the Oklahoma Geological Survey. Map showing location of mineral deposits is also available.

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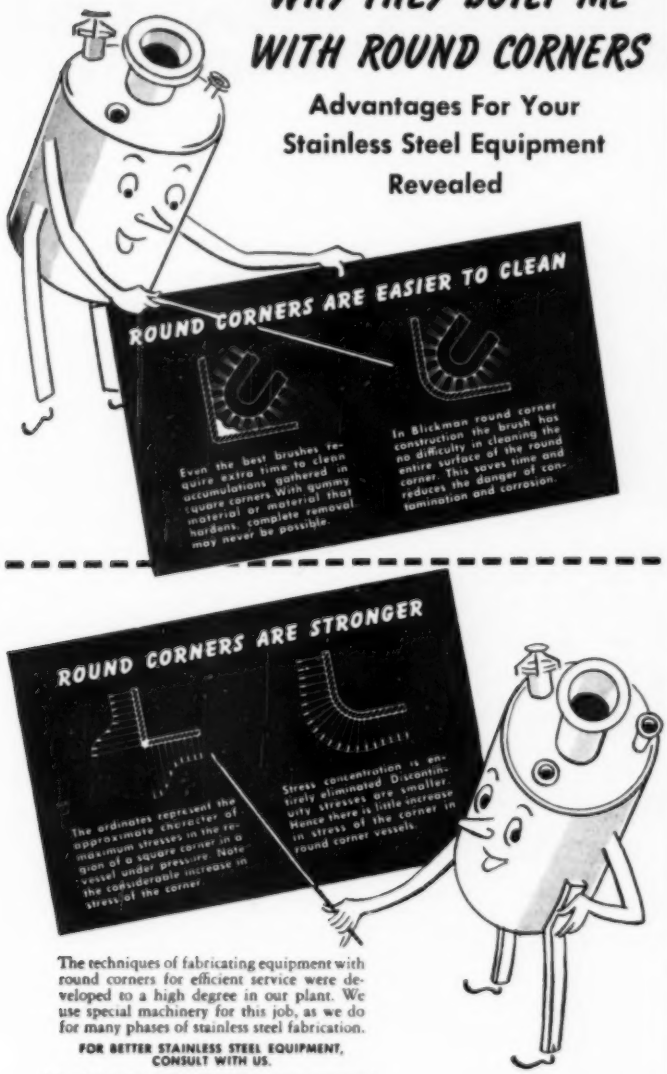
WHY THEY BUILT ME WITH ROUND CORNERS

Advantages For Your Stainless Steel Equipment Revealed


ROUND CORNERS ARE EASIER TO CLEAN
Even the best brushes require extra time to clean accumulations gathered in square corners. With gummy material or material that hardens, complete removal may never be possible.
In Blickman round corner construction the brush has no difficulty in cleaning the entire surface of the round corner. This saves time and reduces the danger of contamination and corrosion.
ROUND CORNERS ARE STRONGER
The ordinates represent the approximate character of maximum stresses in the region of a square corner in a vessel under pressure. Note the considerable increase in stress of the corner.
Stress concentration is entirely eliminated. Discontinuity stresses are smaller. Hence there is little increase in stress of the corner in round corner vessels.

The techniques of fabricating equipment with round corners for efficient service were developed to a high degree in our plant. We use special machinery for this job, as we do for many phases of stainless steel fabrication.

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Guards Alloys in Fabrication

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Investigate their tremendous possibilities in relation to your own product or service. Your specifications are our guide in recommending the particular McGraw-Hill lists that best cover your market. When planning your industrial advertising and sales promotional activities, ask for more facts or, better still, write today. No obligation, of course.

McGraw-Hill Publishing Co., Inc.

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P-9800, Chemical Engineering
330 W. 42nd St., New York 18, N. Y.

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SALES ENGINEER wanted, who is thoroughly familiar with processing equipment for oil refineries and chemical plants in carbon and alloy steels and who is well known in the industries. Prefer younger man, age 30-35, willing to make a success. Please submit your resumes under P-9433, Chemical Engineering.

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PW-9602, Chemical Engineering
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Acme wld. stl. shell, 20"x24", tubes ¾"
HEATERS: (3) Wld. stl., 6'dia x9'lg., horiz.
Copper, 3" dia., 276 tubes 1¼"xs", 12 sq.
CONDENSER: All copper, 36"x17", 379 tubes 1¼"
C. I. shell, 276 cu. tubes ¾"xs"
CARBON ABSORBERS: (5); Amer. Sole. R., sc.screens
PRESSURE VESSELS: (2)40"ODx8"lg., fitted contns.
¾" wld. plate, 5'-9" lg. oval ends
5/16" wld. stl., 61"ODx60" lg.
AIR FILTERS: (4) wld. ¾" plate, 4'6"IDx10' lg.
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CHLORINATORS: (2) W&T, 1-3000# cap., 1—150 cap. new
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1—Rotary Vacuum Dryer 5' x 33'.

1—Vacuum Shelf Dryer, 17 Shelves, 40' x 43".

3—7500 gal. Closed Steel Kettles, 10' dia. x 12'6" deep, with Copper Coils, Closed, Bronze Propeller Agitators, Enclosed Motor Driven Worm Gear Drives.

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1—Copper 50 gal. Vacuum Pan, with jacket and coil.

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PROCESS EQUIPMENT FOR SALE
COOLERS: Amer. Solv., 8'x49x30, cu. tubes, fins (2) Shell, centr. exp., cu. tubes, 6"x17" Acme wld. stl. shell, 29"x24", tubes ¾" HEATERS: (3) Wld. stl., 6'dia.x9'lg., horiz. Copper, 3" dia., 376 tubes 1¼"x8", 12 ga. CONDENSER: All copper, 36"x17", 370 tubes 1¼" C. I. shell, 278 cu. tubes 5⅛"x96" CARBON ABSORBERS: (5), Amer. Solv. R., ss screens PRESSURE VESSELS: (2)40"ODx8'lg., flngd constrs. ¼" wld. plate, 5'x9' lg. oval ends 7'10" wld. stl., 41"ODx68" lg. AIR FILTERS: (4) wld. ⅜" plate, 4'6"IDx10' lg. DELPHEGMATOR: 2000 sq. ft., 26"x22", 250 tubes HEAT EXCHANGER: Whitlock, 335 sq. ft., 15"x16' CHLORINATORS: (2) W&T, 1-3000# cap., 1—15# cap; new FILTER PRESSES: Sperry 36", 60 frm. plates, hydr. ALSO: PUMPS, MOTORS, TANKS and OTHER EQUIP.
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3—7500 gal. Closed Steel Kettles, 10' dia. x 12'6" deep, with Copper Coils, Closed, Bronze Propeller Agitators, Enclosed Motor Driven Worm Gear Drives.

1—2000 Gal. Steel Kettle, Jacketed, open top, Agitated 7' dia. x 7'6" deep.

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2—Baker Perkins Mixers, Size 17, Jacketed, 200 gal.

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1—Kilby 39" x 39" cast iron Filter Press, washing type, plate and frame, 47 Chambers.

3—36" x 36" Sperry 60 plate Filter Presses, cast iron, recessed, center feed, open delivery, hydraulic closing, including individual motor driven hydraulic pumps.

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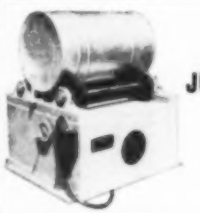

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5—Baker-Perkins double arm, mixers, 200 gals, sigma blades
1—J. H. Day Mogul type mixer, 5 gals.
5—Simpson #0 Intensive mixers
1—Baker-Perkins jacketed lab mixer, size 6, Stainless Steel

1—Bird Suspended type Centirfuge, 40" Stainless Steel perforated basket with motor
1—Tolhurst Suspended type Centrifuge, 40" rubber perforated basket, with motor
1—Tolhurst center slung Centrifuge, 30" rubber basket, with motor
1—Tolhurst solid curb centrifuge, 20" rubber basket, with motor
1—Podbielniak Stainless Steel centrifugal extractor, model 4080
10—Sharples Super-Pressurite Centrifuges, with 3 H.P. Expl. proof motors
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1—Steel Jacketed Kettle, 7'3" x 7'.
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1—Glasscote Jacketed Glass Lined Kettles, 350 gals.
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1—Shriver bronze plate & frame Filter Press, 18" x 18".
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1—Sweetland #5 Stainless Steel filter.
1—Vallez #3 Filter.

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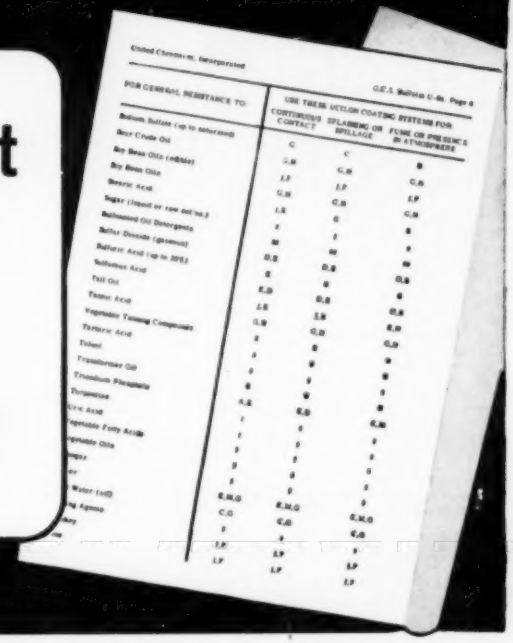

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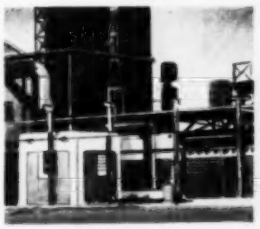

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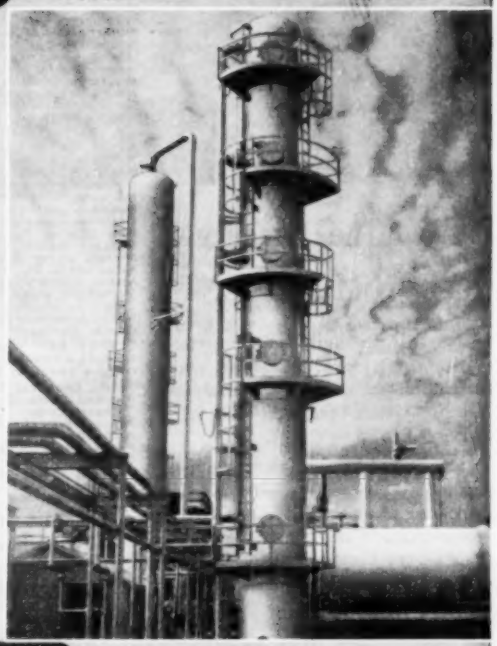

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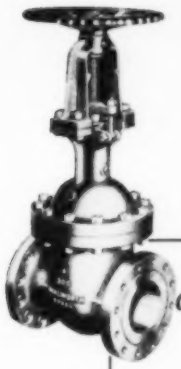

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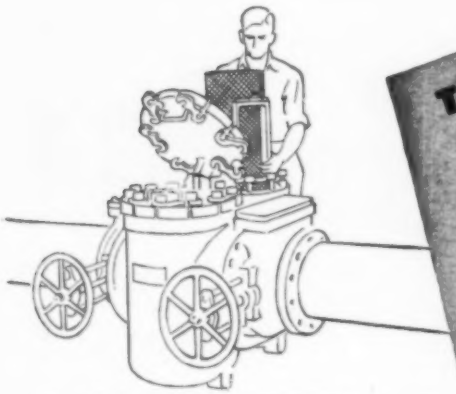

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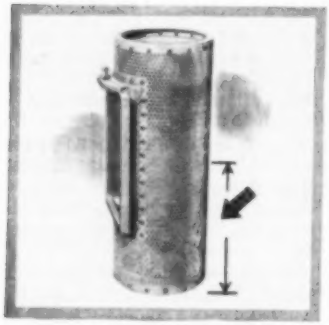
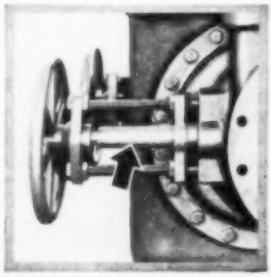


LARGER CAPACITY BASKETS — approximately 5 to 1 ratio with standard mesh. Larger baskets make fewer cleanings necessary.

QUICK-VISIBLE VALVE POSITION INDICATOR cuts out all guesswork as to which straining chamber is working.



SHOWN on this page are a few of the many new, striking advantages in these new Twin Strainers. Other features include steel doors, crack-proof and quick-opening . . . provision for adding a "wearing-plate" to handle extremely corrosive water . . . provision for adding chain drive or valve interlock, without dismantling valves . . . and other features to provide maximum economy in non-stop straining.

Elliott Twin Strainers are available in sizes 1" to 24" for 125 lb. pressure and 1" to 12" for 250 lb. pressure. Full details in the interesting new bulletin, on request. Mail the coupon.

EASY-OUT VALVE DISC — Simplifies replacing of valve disc ring when it is required. No need to dismantle valve.

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On thousands of applications in every field of manufacture, stepless variable speed operation assures exactly the right speed for every operation . . . for every operator . . . the right speeds for each change in the consistency or shape of the material being processed. Such variable speed operation pays off in higher rates of production, a more uniform better quality product and more efficient performance of your equipment and your operators.

variable speed operation helps you make a good job better

Master Speedrangers provide this infinitely variable speed in an all-metal, mechanical variable speed unit whose compactness and durability are extra features to help you make a good job better. And nowhere else will you find variable speed drives that are so flexible, so easily adaptable and in such a wide range of types and sizes.

For example, look at the controlled volume pumps shown below. The Speedranger, on the drive unit incorporates an explosion proof motor, a variable speed unit and a gear reduction . . . all standard Master units that easily combine into one compact, integral power package. This provides exactly the right speed, the right features, in a unit that you can mount right where you want it.

Probably you will not need this same combination of features. However, the next time you need a drive for material processing, handling, and conveying equipment; mixers and agitators; welding-positioners; machine tool drives; testing and calibrating equipment . . . to name only a few . . . see what a really remarkable job Master Speedrangers can do for you. Write for Data 7525, new twenty-four page booklet on Speedrangers.

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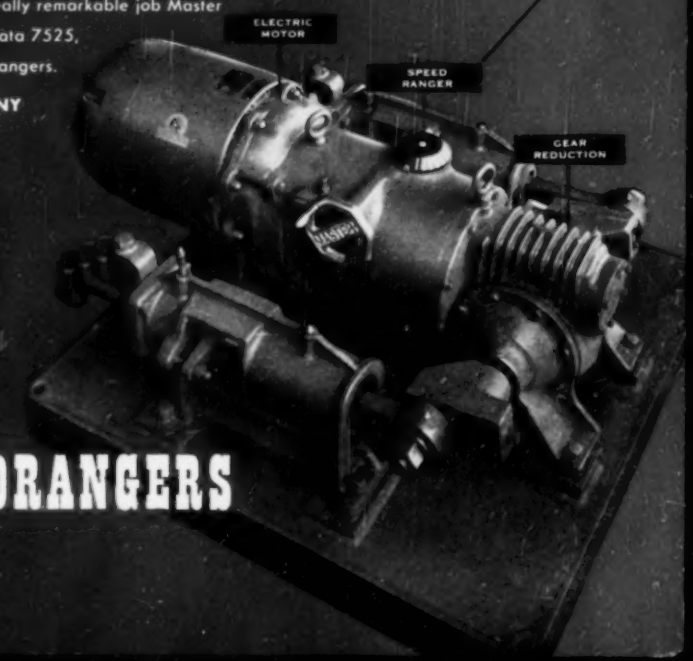
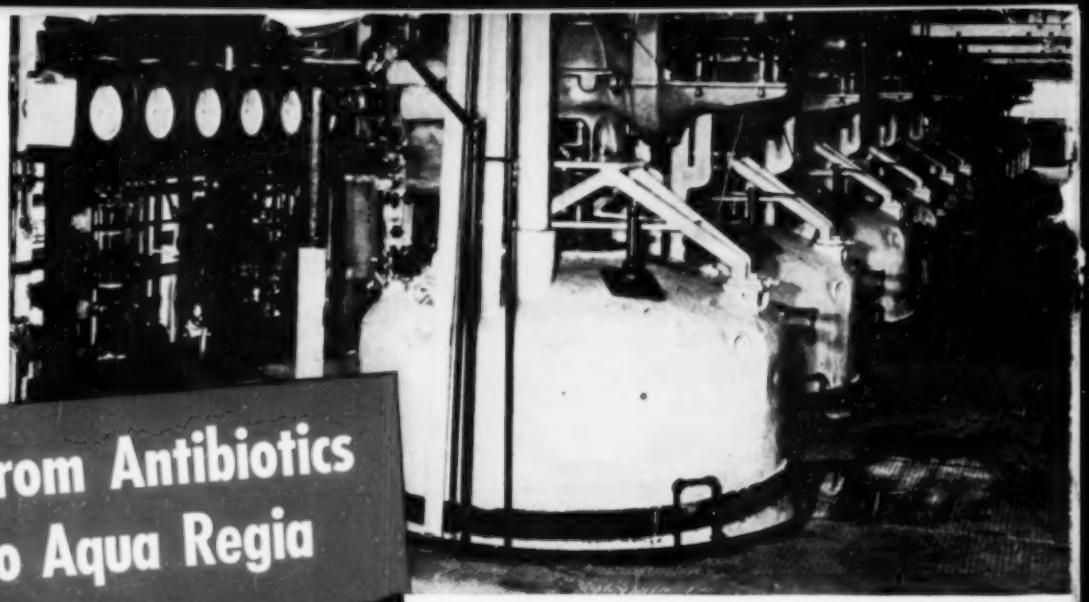


especially when you use

MASTER SPEEDRANGERS



From Antibiotics to Aqua Regia

A battery of Pfaudler "R" (high pressure) glass-lined reactors at E.R. Squibb New Brunswick, N.J.

Pfaudler Glass-lined Reactors give your product real protection

To maintain the purity of such products as penicillin, streptomycin, chloromyetin and other antibiotics, leading pharmaceutical manufacturers rely on Pfaudler acid-resisting glass-lined steel reactors for final processing.

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Long experience gained from meeting such diversified service conditions has made it possible for Pfaudler to develop *standard, low priced reaction equipment for both* high pressure and low pressure work. Are you taking advantage of this?

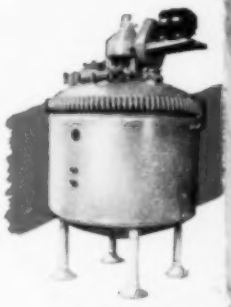
"R" Series Reactors (high pressure) This series of Pfaudler glass-lined steel reactors ranges in size from 200 to 2,000 gallons. *Standard* ASME Code built units are designed for internal pressures of 50, 75 and 100 psi., coincident with 90 lbs. jacket pressure (or 75 lbs. with full internal vacuum). Higher pressures obtainable in custom built designs.

One piece in construction, lined with highly acid-resisting Pfaudler glass, equipped with motor driven glass covered agitator with adjustable baffle. Will handle mixing problems ranging all the way from blending to gas absorption. Send for catalog 860.

"R" Series Reactor

"E" Series Reactors (low pressure) This *standard* line differs from "R" Series mainly in the use of clamped-top heads. Capacities range from 5 to 2,000 gallons inclusive. Sizes from 5 to 100 gallons are designed for laboratory and pilot plant work. Otherwise, they are lined with the same type of Pfaudler highly acid-resisting glass, with clamped-top heads and motor driven agitators of either the anchor or impellor type. Adjustable baffles are also available.

Standard jacket pressures—90 psi. Internal pressures vary with capacity but range from 25 lbs. to 100 lbs. Ask for catalog No. 817.



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